Volume II

Final Report

Skylab Analytical and Test Model Data

Analysis of Structural Dynamic Data from Skylab



(NASA-CR-144286) ANALYSIS OF STRUCTURAL DYNAMIC DATA FROM SKYLAB. VOLUME 2: SKYLAB ANALYTICAL AND TEST MCDEL DATA Final Report (Martin Marietta Corp.) 216 p HC \$7.75

N76-22270

.75 Unclas CSCL 22B G3/18 26872

MAY 1976
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MCR-76-179 Contract NAS8-31224

Volume II

Final Report

March 1976

Skylab Analytical and Test Model Data ANALYSIS OF STRUCTURAL DYNAMIC DATA FROM SKYLAB

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This volume is a compendium of the orbital configuration test modal data, analytical test correlation modal data and analytical flight configuration 1.2 modal data. Section A presents tables showing the generalized mass contributions (GMCs) for each of the thirty test modes. Section B presents the two dimensional mode shape plots for the thirty test modes. Tables of GMCs for the test correlated analytical modes are presented in Section C. These analytical modes were generated from a model that was adjusted to match test results by use of the methodology discussed in Sections 2.3 and 5.4 of Volume I of this report. Section D presents the two dimensional mode shape plots for the analytical modes. Sections E and F contain the uncoupled and coupled modes of the orbital flight configuration 1.2 at three development phase of the model. These phases of the model, initial, pretest and final, are described in detail in Section 1 of Volume I of this report.

SECTION A

Test Modes GMC Tables

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The following Tables A-1 through Λ -60 show the generalized mass contributions (GMCs) for each of the thirty test modes. Two types of tables are given for each mode. The first table gives a summary of GMCs for major structural components while the second table shows the GMC for each of the 193 degrees of freedom contained in the reduced test data. These GMC data were calculated using a 193 x 193 discrete mass matrix derived using static collapse of analytical component mass matrices. It should be noted that the GMC distribution shown for Mode 02A is highly distorted due to apparent bad accelerometer data for the aft OWS Skirt station 3100.

TABLE A-1 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 01A		TEST	FREQUE	NCY =	•31 HZ•	
C OM PONE NT NAME	GMC. (f)X)	GMC (DY)	GMC (DZ)	GMC (T/X)	GMC (TY)	GMC (TZ)
BR/OWS SKIRT/IU/FAS 6-FAS 02 TANKS MDA/STS/AM 6-AM N2 TANKS COMMAND/SERVICE MOD. DEPLOYMENT ASSEMBLY ATM-RACK, CMGS, 4-SAS ATM-SPAR CENTER 4TM-GRA/CAN CENTER	.0060 .0019 .0003 .0003 .0003 .0001 .0014	.0013 .0126 .0322 .0005 .0065 .0007 .0027 .0005	.2069 .1123 .1385 .0228 .2641 .0237 .1336 .0298	.0701 0. .0302 0. .0303 0. .0300 .0300	.0036 0. .0023 0. 0001 3. .0000 .0000	.0086 3. .0073 9. .0001 3. .0000
SUM	.0106	.3171	. 9559	.0109	.7062	.0092

BR/OWS SKIRT/IU/FAS	.2266
6-FAS DZ TANKS	.1157
MDA/STS/AM	.1439
6-AM N2 TAMKS	.0235
COMMAND/SERVICE MOD.	.2713
DEPLOYMENT ASSEMBLY	.0245
ATM-RACK, CMGS, 4-SAS	.1381
ATM-SPAR CENTER	.0306
ATM-GRA/CAM CENTER	.0248

TABLE A-2 GENTPALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 01A - RUN NO. 333 FREQUENCY =

•	1 = 31	341.15	UIA	₹014 140 .	, o o	CK# BOEN	OV = •31
	•			·		•	
400%		GMC			SMC		
NO.	(uX)	(DY)	(07)	(TX)	(TY)	(17)	DESCRIPTION
	0.056	0004	2262	0004	6070	0000	24.05 24.0 02.00
1 2	.0055 .0001	0001 .0002	.0869 .0269	•0001 •0000	050Q. - 000G		BASE RNG/DWS SKIRT OWS/IU INTERFACE
3	0001	.0002	.0625	.0000	.0012		TUZFAS INTERFACE
, 4	.0001	.0010	.0174	ĵ.	0.0312		FAS 02 80TL1,+Y +Z
=	.0001	.0004	0264	ð.	9.		FAS 02 301L2,+Y +Z
5	.0017	.0004	.0246	0.	0.		FAS 02 30TL 3, -Y +Z
7	.0901	.0004	.0239	0.	0.		FAS 02 30TL4, -Y +Z
q	. 7001	.0003		0.	0.		FAS 02 BOTL5,-Y -Z
à	.0000	.0001	.0162	0.	0.	0.	FAS 02 90165,-Y -Z
10	• 3 9 9 9	.0000	.0058	3 •	0.		FAS/AM/DA IF, +Y
11	.0004	•0005	.0098	0 • '	9.	0.	FAS/AM/DA IF, +Z
12	-• 0000	.0002	.0107	0.	0.	0.	FAS/AM/DA IF, -Y
13	-•0000	• 0000	.0033	j.	0 •	0.	FAS/74 IF, -Y -Z
14	. 2200	.0000	.0051	0.	0.	0.	FAS/AM IF, -Z
15	.0000	0000	.0013	J.	0.		FAS/DA TF, +Y -Z
15 17	.0002	•0003		.0001	•0002 •0001	.0003	AM TUNNEL/SHEAR WB
1 ' 1 R	.0000 .0000	•0008 •0009	.0180 .0578	.0003	• 0001	• 0 0 0 0	AM TUNNEL/STS IF MOA/STS INTERFACE
19	•0000	• 00002	.0460	0002	•0019		MOA CONEVOYE ITREC
2)		.0001	.0038	0.0002	0.	0.	N2 TANK, +Y, LOWER
21	. 1001	.0001	.0045	3.	0.	0.	NZ TANK, +Y, JPPER
22	. 3001	.0001	.0025	0.	J.	0.	N2 TANK, +Z, LOYER
27	•0100	.0001	.0049	0.	0.		N2 TANK, +Z, UPPER
24	.0001	.0001	.0035	0.	0.	0.	NZ TANK -Z, LOWER
25	. 0 0 0 0	.0000	.0043	J •	0.	0.	M2 TANK, -Z, UPPER
25	.0003	• 1019	.0478	3938	0000	.0000	CM, FAB BULKHEAD
? 🔻	.0002	•0030	.0836	0000	0001	.0000	CM, AFT BULKHEAD
28	.0001	.0013	•0 5 92	•0003	0000	.0001	SM, FAD BULKHEAD
29	• 6000	.0014	.0743	.0001	0000	0000	SM, AFT BULKHEAD
3.9 	.0001	.0002	.0035	0.	0.	0.	LOWER D LATCH, DA
31 32	.0001	• 0006	.8971	0.	0.	0.	LOWER +Y TRUNNION
* 2 * 3	0000	0001	0105) • o	9.	0.	LOWER -Y TRUNNION
74	.0000 .0002	.0001 0001	.0025	0. 0.	մ. G.	0 • 0 •	FREP PACKAGE C.G. ATM PN 5,7 IF, OUTR
75	• 0 0 0 3 3 • 0 0 0 5	0001	.0118	0.	0.	9.	ATM PN 4,5 IF, OUTR
35	.0000	.0001	.0160	0.	j.	0.	ATM PN 8,1 TF, OUTR
27	.0334	.0005	.0163	0.	0.	0.	ATM PN 2,3 IF, OUTP
38	0000	.0009	.0157	j.	0.	0.	ATM PN 5,7 IF, INNR
39 -	0002	.0006	.0065	0.	3 •	0 •	ATM PN 4,5 IF, INNR
40	.0000	.0004	.0122	0 •	0.	0.	ATM PN 8.1 IF, INNR
41 .	.9901	.0004	· 6154	0.	0.	0.	ATM PN 2,3 IF, INNR
42	0033	0000	.0047	.0000	• 3003	.0000	CMG, -Y SIDE '
43	•0000	.0001	.0047	.0000	0000	0000	CMG, +Y SIDE
44	.0001	0000	.0008	0000	• 0 0 0 4		CMG, ** SIDE
45	0000	0000	0.	0.	0.	0.	ATM SAS, PN 1
4 K	.0000	•0000	0• .	0.	J.	0.	ATM SAS, PN 3
47 48	.0001	- 00001	0.). 0	0.		ATM SAS. PN 5
43	0000 -0002	0000	0.008	0. •0000		0.	ATM SAS, PA 7 SPAR DENTER
= 0	.0002 .0001	• 00 0 5 • 00 0 0	.0298 .0243	•0003	•0000 •0000		GRAVIDAN DENTER
υ	• J7Ul	-0000	• 4 6 4 3		****	• 0 0 0 1	- O CM CO O O O O O O O CM CO O O O O O O
504	. 3105	.0171	.9559	.0009	.0062	. 0094	•
		ORIGI	NAL PAGI	E IS			
•		OF PO	OR QUAL	ITY _i			
			•			•	

TABLE A-3 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. C2A		TEST				
COMPONENT	GFF C	GMC	GMC	GMC	GNC	GM C
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	. 2014	• 318	. 3930	.0308	.1701	.1336
6-FAS 02 TANKS	.0004	• 6316	.0009	0.	0.	0.
MDA/STS/AM	.0000	.0418	.0001	0131	. 5000	. 0004
5-AM N2 TANKS	.0000	. 2374	.0001	٥.	0.	0 •
COMMAND/SERVICE MOD.	.0001	. 3525	.0349	.0011		.0000
DEPLOYMENT ASSEMBLY	.0003	• 3056	.0001	0.	ŋ.	0.
ATM-RACK, CMGS, 4-SAS	.0005	.0351	.0006	.0000	.0000	. 2000
ATM-SPAR CENTER	.0000	. 33 94	.9384	0300	.0000	J .
ATM-GRAZCAN CENTER	.0000	.0074	.0003	.0006	.0000	.0000
SUM .	. 20 27	.2219	3995	.0318	.0702	.1040

BR/OWS SKIRT/IU/FAS	.8007
6-FAS 02 TANKS	.0323
MDA/STS/AM.	.0422
5-AM N2 TAMKS	.0076
COMMAND/SERVICE MOD.	.0576
DEPLOYMENT ASSEMBLY	.0060
ATM-RACK, CMGS, 4-SAS	.0362
ATM-SPAR CENTER	.0[98
ATM-GRAZCAN CENTER	.0077

TABLE A-4 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE

2927

.2219

.3995

.0018

.0702

.1040

SUM

02 A

RUN NO. 336 FREQUENCY = . 31 からり = GMO GMC - GMC GMC - SMC GMC NODE V7. (DX) (DY) (07)(TX) (TY) (TZ) DESCRIPTION .2911 . 3928 .0007 .1033 BASE RNG/DWS SKIRT .0358 .0791 2 -. 7000 .0056 -.0001 .0000 .0000 -.0001 OWS/JU INTERFACE .0004 3 .0000 .0164 .0002 .0001 .0000 IU/FAS INTERFACE FAS 02 .0042 .0004 0. C. 0. BOTL 1.+Y +Z Ę .0001 0. .0051 -. 0000 9. FAS 02 BOTL 2,+Y +Z 0. 5 0. 0. .0000 . 3057 .0002 0. FAS 02 BOTL 3 .- Y + Z .0003 .0054 .0000 F4S 02 BOTL4,-Y +Z 0. 0. J. 8 -.0000 .0058 .0000 0. 0. 0. **FAS 02** 901L5,-Y -Z 4 -.0000 .0049 .0901 FAS 02 BOTLS,-Y -Z 0. 0 . J. .0001 10 G. 0. FAS/AY/DA IF, +Y .0019 -. 0000 ŋ. -.0003 FAS/AM/DA IF, +Z 11 .0001 .0027 0. . 0 . 0. .0001 . 12 -- 0000 .0029 0. O. 0. FAS/AM/DA TF. -Y 9 7 -.0000 0. FAS/DA IF. .0003 -.0000 0. 0. 44 3. J . FAS/AM IF. -7 .0000 .0018 . C000 n. FAS/DA IF, 15 .0000 .0003 -.0000 0. +Y -7 .0000 .0000 .0000 15. .0000 .0040 .0002 AM TUNNEL/SHEAR WB 17 .0000 .0088 .0000 .0000 .0000 -.0303 AM TUNNELISTS IF 18 .0000 .0147 -.0000 -.0001 .0000 .0001 MDA/STS INTERFACE 19 MDA CONEZCYL ITREC . 1000 .0143 .0001 -.0000 -.0000 .0001 .0009 0 • 20 . 2200 .0000 N2 TANK, +Y, LOWER 0. 0. 0. 21 -.0000 .0010 .0000 0. 0. . . NZ TANK, +Y, JPPER 22 . 0000 .0011 .0001 0. N2 TANK, +Z, LOWER 0. J. 23 .0003 .0619 .0000 0 . TANK, +Z, UPPER u. 0. N2 .0000 N2 TANK -7, LOWER 24 .0013 . 6000 0. 0. 0 . .0012 25 .0000 .0000 0. 0. 0. N2 TANK, -Z, UPPER 25 CM, FWD BULKHEAD -.0000 .0194 .0009 .0007 .0000 .0000 27 .0000 -.0000 .0142 .0000 .0002 - .0000 CM. AFT BULKHEAD **၁** q .0000 .0001 .0002 .0000 -.0000 SM, FWD BULKHEAD .0101 20 .0000 .0000 SM, AFT BULKHEAD . 1001 .0188 .0030 .0000 77 LOWER .0000 .0342 .0000 D LATCH, DA 0. 0. 0. 0. G. 0. 31 .0002 .0003 .0001 LOWER +Y TRUNNION 32 LOWER -Y TRUNNION .0001 .0003 -.0000 0. 0. 0 . 33 -.0000 .0007 .0000 0. EREP PACKAGE C.G. 0. 0. 74 .0001 .0050 .0001 Û. ATM PN 6.7 IF.OUTR ۵. 0. 75 .0030 0. -.0000 -.0000 Û. ATM PV 0. 4,5 IF, OUTR 75 -.0701 .0032 .0002 ATM PN 8.1 IF.OUTR 3. **3** • 77 .0001 .0058 .0001 0. 0. ATM PN 2.3 IF, OUTR 0. 3 0 .0000 .0050 .0000 0. ATM PN IF, INNR 0. J . 5,7 39 -.0001 .0009 .0000 0. ATM PN 0. 0. 4.5 IF, INNR ĺη -.3991 . CO 01 0. .0015 J . 0. ATM PN 8.1 IF, INNR .0154 .0000 ATM PY 41 . 1030 0. 0. 2,3 IF, INNR 42 . 3 7 9 8 .0013 .0000 .0000 .0000 -.0000 CMG, -Y SIDE 43 .0001 -.0000 .0000 CMG, +Y SIDE .0000 .0013 .0000 .0000 -.0000 .0000 44 .0000 CMG, +X SIDE .0000 .0013 45 0. 0. 0 . .0001 .0001 0. ATM SAS. PN 1 0. 45 0. 0. ATM SAS. .0001 .0001 0. >N 3 47 ATM SAS, PN .0001 0. 0. 0. 5 .0001 U. £ 8 .0201 .0001 0. ATM SAS. PN . 1100 .0004 .0000 .0000 SPAR CENTER 69 .0094 -. 0000 πŋ .0003 .0000 .0000 .0074 .0000 .0000 GRAZCAN CENTER

TABLE A-5 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 036	TEST FREQUENCY = 1.31 HZ.						
COMPONENT	G H C	GHC	GMC	GMC [°]	GM C	GMC	
NAME	(nx)	(Y C)	(DZ)	(TX)	(TY)	(TZ)	
BR/OWS SKIRT/IU/FAS	.0180	. 5001	.0152	.6386	.(102	.0000	
5-FAS 02 TANKS	.0209	.0900	.0025	e.	C	0.	
MDA/STS/AM	.0111	. 9999	.9130	.0331	.0007	.0309	
5-AM N2 TANKS	.0034	. 0000	.0007	0	O	0.	
COMMAND/SERVICE MOD.	.0135	.0091	.4132	.0384	.078	0013	
DEPLOYMENT ASSEMBLY	•0032	0002	. 30 99	С.	S • .	0.	
ATH-RACK, CMGS, 4-SAS	.1823	.0026	-1187	•030¢	.0001	6000	
ATM-SPAR CENTER	.0536	.3331	. 3246	.03064	.0926	0.	
ATM-GRAZCAN CENTER	.0506	. 0000	.0163	.0000	.0033	.6000	
SUM	. 3567	. 9926	.6142	.0004	.0247	.0013	

BRIOWS SKIRT/IU/FAS	.0435
6-FAS 02 TANKS	.0234
MDA/STS/AM	.0249
6-AM N2 TANKS	.0:42
COMMAND/SERVICE MOD.	. 4362
DEPLOYMENT ASSEMBLY	.0129
ATM-RACK, CMGS, 4-SAS	. 31 37
ATM-SPAR CENTER	.0819
ATM-GRAZOAN CENTER	.0702

TABLE A-6 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM TEST MODE 030 RUN'NO. 614 FREQUENCY = 1.31

_							
พถูกร	, G M (C	_	GMG-	-	GMC	GMC	
47.	(77)	(DY)	(02)	(XX)	(TY)	(TZ)	DESCRIPTION
		0000	6471	2222	8070	0.000	24.05 24.6 42.40 24.55
1 2	.0072	.0000	.0134	.0000	.0058		
7	.1019	.0000	.0002	.0000	.0013		
	.0047	-0000	6000	•0000	•0032		IU/FAS INTERFACE
4	.0045	•0000	.0004	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0052	.0000	.0004	0.	0.	0.	FAS OZ BOTLZ,+Y +Z
· 6	• 0 053	.0100	.0063	3.	0.	9.	FAS 02 80TL3,-Y +Z
	. 1937	.0000	.0005	0.	0.	3 •	FAS 02 80TL4,-Y +Z
а.	.0010	.0000	.0005	0.	0.	0 •	FAS 02 30TL5,-Y -Z
· •	. 1001	•0000	.0003	0.	0.	0.	FAS 02 30 L5, -Y -Z
10	.0003	.0000	.0003	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0733	.0000	.0004	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0005	.0000	.0007	j.	0.	0.	FAS/AM/DA IF, -Y
13	. 3009	0000	.0001	3.	J •	0 •	FAS/DA IF, -Y -Z
14	• 0 0 0 0	0000	.0001	9.	0.	0.	FAS/AM IF, -Z
15	• 1000	.0000	.0001	0.	0.	3 •	FAS/DA IF, +Y -Z
15	•0717	.0000	.0002	.0000	.0302	.0000	
17	.0027	• 0000	.0020	• 0 6 0 6	.0000	.0000	
<u> </u>	• 9 9 3 8	.0000	.0043	.0000	. 3034	.0000	MDA/STS INTERFACE
19	.0030	.0000	.0058	• 0000	.0001	0000	MOA CONEZCYL ITREC
23	• 1 9 9 5	.0000	.0000	0.	0.	0 •	N2 TANK, +Y, LOWER
21	• 9 9 9 4	•0000	.0002	ŋ .	0.	0 •	NO TANK, +Y, UPPER
22	•0009	.0000	.0001	0.	0.	0 •	N2 TANK, +Z, LOWER
23	•0013	• 0000	.0002	0.	0 •	0.	N2 TANK, +Z, UPPER
74	.0001	.0000	.0000	0.	Ð.	0 •	N2 TANK -Z, LOWER
25	.0001	.0000	.0002	0.	ĵ.	0 •	N2 TANK, -7, UPPER
26 '	.0023	• 00 00	.0001	0000		.0000	•
27	.0023	.0000	.0303	0000		.0001	CM, AFT BULKHEAD
29	.0931	. 0000		.0001	.0012	.0011	· · · · · · · · · · · · · · · · · · ·
5.3	•0051	•0000	.3481	.0003	.0059	.0001	
3.0	• 0,001	0000		· <u>·</u> •	3 ·	0.	LOWER D LATCH, DA
31	.0005	0001	.0045	0.	0.	0 •	LOWER +Y TRUNNION
3?	. 9 9 0 4	0001	. 8647	0 •	0 •	0.	LOWER -Y TRUNNION
37	•0032	• 0000	.0005	0.	0.	0 •	EREP PACKAGE C.G.
	.0225	0000	.0029	0.	0.	0 •	ATM PN 6,7 IF, OUTR
35	.0393	0000	.0055	0.	0.	3 •	ATM PN 4,5 TF, OUTR
٦ <u>५</u>	.0407	1001	.0153	0.	0.	3.	ATM PN 8,1 IF, OUTR
37	.0347	.0003	.0379	0.	0.	0 •	ATM PN 2,3 IF, OUTP
38	.0042	• 0000	.0042	9.	0 •	0 •	ATM PV 5.7 IF, INNR
79	.0112	0001	.0037	0.	0 •	0.	ATM PY 4,5 IF, INNP
40	.0113	0002	.0105	0.	0 •	J •	ATM PN 8,1 IF, INNR
L 1	.0244	.0006	•.0237	0.	0.	0.	ATM PV 2,3 IF, INNP
42	• 2036	0000	.0039	0000	.0001		CMG, -Y SIDE
43	.0043	• 0 0 0 0	.0027	0000		0000	
44	.0046	0000	.0082	.0000			CMG, +X SIDE
45	.0002	.0002	ງ.	0.	0.	0.	ATM SAS, PN 1
46 • =	.0002	.0002	0.	ĵ.	0.	0.	ATM SAS, PN 3
47	.0009	.0009	0.	0.	0.	0.	ATM SAS, PN 5
4.9	.0008	.0008	0.	0.	0.	0.	ATM SAS, PN 7
49	• 0535	.0001		.0000	. 0 126	• 0536	SPAR CENTER
F 0	·0505	, • 0000	.0163	.0000			GRAZCAN CENTER
SUM	• 3567	.0026	.6143	.0004	.0247	. 0550)

TABLE A-7 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 244	TEST FREQUENCY = 1.43 HZ.					
COMPONENT	GM C	GMC	GMC	GMC	GM C	GM C
NAME	(XG)	(DY)	(DZ)	(TX)	(YY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0021	.0249	. 60 24	·[147	.0000	• (096
5-FAS 02 TANKS	.0030	.0028	.0048	0.	0.	0.
MDA/STS/AM	.0901	.0096	•ប្ដូក្	.:129	0000	.0007
5-AM N2 TANKS	.0003	.0008	.3092	С.	ί.	0 •
COMMAND/SERVICE MOD.	.0004	. 1988	.9091	.[]27	.0001	.0063
DEPLOYMENT ASSEMBLY	.0035	.3097	.0015	. 3	0.	0 •
ATM-RACK, CMGS, 4-SAS	. 20.94	.3753	.0552	.0005	.6301	.0011
ATM-SPAR CENTER	.0010	. 3032	.0000	.0105	.6994	G.
ATM-GRA/CAN CENTER	.0097	1.3023	3000	.6211	.0304	.0257
		,	***-			
SUM	. 2205	• 518 5	. 05 41	. 8524	.0010	.0434

BR/OWS SKIRT/IU/FAS	.0538
6-FAS 02 TANKS	.0137
MDA/STS/AM	.0133
6-AM N2 TANKS	.0014
COMMAND/SERVICE MOD.	.2085
DEPLOYMENT ASSEMBLY	.0(57
ATM-RACK, CMGS, 4-SAS	.6414
ATM-SPAR CENTER	.0151
ATH-GRAZCAN CENTER	.0512

TABLE A-8 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 04A RUN NO. 378 FREQUENCY = 1.43

					S 14.0	5,40	
<u>אַטַת</u> ַּרּ ,	<u> </u>	GM <u>C</u>	6 <u>40</u>	GMC	SMC	GMC	
۷O.	(9X)	(DY)	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
	. 3300	.0214	.0000	.0077	.0000	10054	BASE RNG/DWS SKIRT
1 2	• 0 0 0 0 • 0 0 0 0	.0012	• 0000	.0027	.0000	.0017	
. ₹	.3300	.0005	.0004	.0043	.0000		IU/FAS INTERFACE
· 4	.0112	.000	.0011	8.	0.	9.	FAS 02 BOTL1,+Y +Z
. 5	.0312	.0006	.0002	3. 3.	0.	0.	FAS 02 BOTL2,+Y +Z
ر ج	. 1001	.0011	.0004	0.	. û .	3.	FAS 02 80TL 3,-Y +Z
	• 0009	.0003	.0013	0.	0.	J.	FAS 02 30TL4,-Y +Z
Ą	• 0 0 0 5	.0003	.0015	0.	0.	0.	FAS 02 30TL5,-Y -Z
ان ن	.8031	.0005	.0004	J.	0.).	FAS 02 30TL6,-Y -Z
10	.0010	.0701	- 00004	0.	0.	0.	FAS/AM/DA IF, +Y
11	.9929	.0017	.0000	3.	S.	3.	FAS/AM/DA IF, +Z
12	.0710	.0700	.0014	0.	0.	0.	FAS/AM/DA IF, -Y
1.6 1.3	.0000	0000	.0001	3.	0.	9.	FAS/DA IF, -Y -Z
14	• 6 9 9 9	.0001	0000	0.	5.	0.	FASZAM IFZ
1=	.0001	0000	.0000	3.	0.	3.	FAS/DA IF, +Y -Z
15	• 00001	.0000	.0000		•0000		AM TUNNEL/SHEAR WB
1 n 4 7	.0000	.0011	•0000	.3087	.0000	.0002	
		•0011 •0029	•0000	.3037	0000	.0005	•
18	.0000 .0000	.0029	.0000	.0010	0000	.0000	
1·3 21	.0000	.0000	.0001). .usin	9.	0.	NO TANK, +Y, LOWER
	.0002	.0000	.0001	S•	0.		N2 TANK, +Y, UPPEP
21	• 0 9 9 0	.0701	.0001	0.	0.	0.	N2 TANK, +Z, LOWER
22			.0000	J.	0.	0.	M2 TANK, +Z, UPPER
2.3	.0000	.0005	•0000		ŭ.	0.	
24	.0000	.0031		0.		0.	N2 TANK +Z, LOWER N2 TANK, +Z, UPPER
25	.0000	.0000	.0000	0.007			The state of the s
25	.0003	.0010	0000	.0003	.0000	.0003	
27		0070	.0000	.0006	0000 .0000	.0005	SM, FWD BULKHEAD
28	0000	.0144 .1765	0003	.0007 .0012	.0001		SM, AFT BULKHEAD
23 23	.0034 .0030	.0017	.0001 .0000	9.	0.	0.	LOWER D LATCH. DA
7 0	.0030	0008	.0007	0 •	0.	0.	LOWER +Y TRUNNION
31		0008			_	_	LOWER -Y TRUNNION
77	A0013		.0007 .0003	0. 0.	0.	0.	EREP PACKAGE C.G.
33 36	.0000	.0007 .0726	.0041		0.	0.	ATM PN 5,7 IF, OUTR
?4 35	.0027	•0022	• 0063	0.	9.	0.	ATM PN 4,5 IF, OUTR
2 K	.9505 .9425	·0022	.0172	3. 3.	0.	0 °	ATM PN 8,1 IF, OUTR
7 T	.9100	.0658	.0021	9.	0.	0.	ATM PN 2,3 IF, OUTR
3.6	0010	0003	.0021	ĵ.	G •	3.	ATM PN 5,7 IF, INNR
3.0	.0189	.0059	.0055	0.	0.) .	ATM PN 4,5 IF, INNR
		• 0497 • 8467	.0071).).	0.	0.	ATM PN 8,1 IF, INNR
40	.0511		.0010	J.	C.	0.	ATM PN 2,3 IF, INNR
41	0.0125	.1594			•3061.		CMG, -Y SIDE
L2	.0395	.0061	。0044 0055	.0002	3/000		CMG, +Y SIDE
L 7 44	.0117	0701	.0055 0000	.0002	0000 0000		CMG, +X SIDE
. 44 45	.0998	.0391 2004	0.	0.	0.	9.	ATM SAS, PN 1
45	.0004	.0004 .0002	0.),	0 a 5 a	0.	ATM SAS, PN 3
4 **	.0002	.0902	0.) .	0.) •	ATM SAS, PN 5
4.2	.0001	.0001	0.		0,	0.	ATM SAS, PN 7
и с 6 О	.0011	.0031	.0000				SPAR CENTER
E A	.0007	.0123	0000	.0211			GRAZCAN CENTER
** # *:	• 0 11 0 7	• 9" 2 3		• 112,11	* 4 0 0 0 4		
ŞUM	.2205	·F185		.0524			

TABLE A-9 ORBITAL CONFIGURATION MODAL SURVEY
TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 054	1	TEST FREQUENCY = 1.66 HZ.					
C OMPONENT NAME	G押C (DX)	64 <i>C</i> (9 Y)	GMC (DZ)	GHC (TX)	64C (TY)	GM C (T Z)	
BR/OWS SKIRT/IU/FAS	.0084	.0888	.6162	.(67	.0005		
6-FAS 02 TANKS MDA/STS/AM 6-AM N2 TANKS	.0141 .6002 .6007	.0174 .0528 .0036	.0149, .0794 .0016	0. .0128	6. .0001 0.	0. .0057	
COMMAND/SERVICE MOD. DEPLOYMENT ASSEMBLY	.0004 .0078	.2882	.0021	.0187		.0.	
ATM-RACK, CMGS, 4-SAS ATM-SPAR CENTER	.0773 .0030	.1172	.0560	.0103 .0075		.0004	
SUM	.0018	•0168 •6074	.0079	.1222	.(005	•0087 •0505	

BR/OWS SKIRT/IU/FAS	.2142
6-FAS 02 TANKS	.3465
MDA/STS/AM	0718
6-AM N2 TANKS	.0059
COMMAND/SERVICE MOD.	/.3219
DEPLOYMENT ASSEMBLY	.0137
ATM-RACK, CMGS, 4-SAS	.2513
ATM-SPAR CENTER	.0303
ATH-GRA/CAN CENTER	.0445

TABLE A-10 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOR

	TEST	AUUE	05 A	RUN NO.	385	FREQUEN	CY = 1.65 Opt o
							QU A G
พวกร	GMC	- GMC	- GM/C	- GMG	- GMC	GMC	3CON
้งก.	('Y')	(DY)	(57)		(TY)		DESCRIPTION
					-		
1	.0001	.6741	.0041	. 9345	.0004		BASE RNG/DWS SKIRT
2	. 3331	.0046 .0020	.0003	.0121 .0204	.0001 .0001		OWS/IU INTERFACE IU/FAS INTERFACE
3 4	.0001 .0040	.0023 .0017	.0047 .0062	- 92 € 4 - 9	3.		FAS 02 BOTE 1,+Y-+Z
4	•0043 •0003	• 0: 17 • 0° 45	• 0002	0.	0.		FAS 02 BOTL2,+Y +Z
٠ ج	.0007	.0051	.0005	0.	0.		FAS 02 BOTL 3, -Y +Z
-	.0043	.0714	.0024	9.	0.		FAS 02 BOTL4,-Y +Z
я	.0037	.0011	.0023	9.	0.		FAS 02 BOTL Z
၁	.0018	.0037	.0007	0 •	0.		FAS 02 90TL6,-Y -Z
1.0	, 3729	.0002	.0029	0.	0.		FAS/AM/DA TF, +Y
11	0000	.0069	.0000	0.	0.		FAS/AM/DA IF, +Z
12	• ŋ ŋ 4 g	.0003	.0039	3.	0.		FAS/AM/DA IF, -Y
13	•0002	0000	0001	G •	0 •		FAS/DA IF, -Y -Z
1,4	.0003	.0008	. 0000	0.	0.		FAS/AM IF, -Z
15	.0001	0001	.0001	J.	0.		FAS/DA TF, +Y -Z
15	. 2000	.0001	.0001				AM TUNNEL/SHEAR WB
17	.0000	.0038	.0000 .0000	.0030 .0048	•0000 •0000		AM TUNNELISTS IF MDAISTS INTERFACE
18	.0001 .0001	.0157 .0332	.0002	.0039	•0000		MOA CONE/CYL ITREC
19 20	•0001 • 001 4	• 0000	.0002	0.	3.		NO TANK, TY, LOWER
21	.0003	.0062	.0007).	0.	0.	NZ TANK, +Y, UPPER
2?	.0000	•0003	.0000	3.	0.).	ME TANK, +Z, LOWER
23	. 0000	.0924	.0000	0.	9.		NZ TANK, +Z, UPPER
24	.0000	.0007	.0000	0.	0 •	0.	N2 TANK -Z, LOWER
25	.0000	.0001	.0000	0 •	0 •	0.	NO TANK, -Z, UPPER
25	.0001	.0169	• 6000				CM, FAD BULKHEAD
2 7	.0001		.0003		• 0000		CM, AFT BULKHEAD
28	.0004	.0073	.0000	.0051			SM, FWD BULKHEAD
50	0001	. 26 33	.0018	.0059	0002		SM, AFT BULKHEAD
3 f) 7 4	.0000	.0017	.0004	0.	0 •	0.	LOWER D LATCH, DA
••	.9944	.0904 0010	.0003	0.	0 • 0 •	0.	LOWER +Y TRUNNION LOWER -Y TRUNNION
32 33	.0034 .3000	.0030	.0011	0 •	0.	0.	EREP PACKAGE C.G.
74	.0005	.0873	• 00 00	J.	0.	0.	ATM PN 6,7 IF, OUTR
2.5	.0294	.0178	.0054	3.	0.	0.	ATM PV 4,5 TF, OUTR
7 =	.0759	.0540	.0195	0 •	0 •	0.	ATM PN 5,1 TF, OUTR
37	.0937	.0001	.0010	0.	0.	0.	ATM PN 2,3 IF, OUTQ
33	.0002	.0083	.0029	3.	0 •	0.	ATM PN 5,7 IF, INNR
فخ	.0130	.0000	.0014	J •	0 •	0.	ATM PV 4,3 TF, INNP
rΰ	.0123		0083	<u>0</u> •	ŋ.	0 •	ATM PN 9.1 IF, INNR
41	.0038	.0227	.0003	J.	0.	9.	ATM PN 2,3 IF, INNR
62	.0042	.0000	.0024	.0001	.0000	.0001	OMS, -Y SIDE
43	.0031	.0000	.00==	.0002	.9990	.9002	OMG, AY SIDE
44 45	.07J1 - 2000	.0040 0000	• 0000	.0001	0000 0.	.0001	OMG, *X SIDE ATM SAS, PN 1
45 45	0000 .0002	•000S	0. 0.	0.	0.	0. 0.	ATM SAS, PN 3
47	• 0000	.0002	0.	3.	0.	0.	ATM SAS, PN 5
48	.0001	.0001	0.	0.	0.	û.	ATM SAS, PH 7
43	.0330	.0184	.0009	.0075			SPAP DENTER
ΕÚ	.0718	.0168	.0009	.3159			GRAZCAN CENTER
							•
MIJZ	.1138	.6074	.0945	.1222	.0015	.0635	5

TABLE A-11 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. TEA	TEST					
COMPONENT	GM C	GM C	GMC	GMC	GM C	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0174	.0214	. 0550	.0122	.(127	.0053
6-FAS 02 TANKS	.0091	• 0026	.C129	C •	0 •	0.
MDA/STS/AM	• 00 6 2	.0187	.0059	.6132	.024	.0753
5-AM N2 TANKS	.0340	• 5307	.0007	₽.	C.	0.
COMMAND/SERVICE MOD.	.0562	. 6571	.0497	.0168	• L J 58	.0109
DEPLOYMENT ASSEMBLY	.0130	.0062	.0117	0 • ·	0.	0.
ATM-RACK, CMGS, 4-SAS	.1460	. 3415	.1375	.0301	.0001	.0002
ATM-SPAR CENTER	.0375	.3361	. 2166	.0332	.0027	0.
ATM-GRAZCAN CENTER	.0331	.0058	. 1239	.0346	• 00,55	.0048
SUM	. 36 25	• 16 J C	.3210	.[299	.0292	.0974

BR/OWS-SKIRT/IU/FAS	.1339
6-FAS 02 TANKS	60246
MDA/STS/AM	.1126
6-AM N2 TANKS	.0354
COMMAND/SERVICE MOD.	.1965
DEPLOYMENT ASSEMBLY	.0308
ATM-RACK, CMGS, 4-SAS	。3254
ATM-SPAR CENTER	.0661
ATM-GRA/CAM CENTER	.0746

TABLE A-12 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

2UN NO. 434 TEST MODE FREQUENCY = 06 A 1.72 GMC SMC GMC 1177= GMC GMC GMC NODE NO. (DX) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION .0059 .0078 .0515 .0073 .0036 BASE RNG/OWS SKIRT .0183 1 .0028 -.0000 OWS/IU INTERFACE .0025 .0009 .0052 .0026 .0026 .0018 3 .0005 .0058 .0038 TUZFAS INTERFACE . 1923 .0031 0. .0001 .0000 ŋ. 0. FAS 02 BOTL 1.+Y +Z .0005 .0010 .0005 0. 0. FAS 02 301L2,+Y +Z ũ. ç -- 0000 .0008 .0031 0. FAS 02 90TL 3. -Y +Z 0. 0. 7 .0045 9. 0. FAS 02 BOTL 4, -Y +Z .0001 .0005 0. 901LF,-Y -Z Q .0008 .0001 .0030 0. 0. 0. FAS 02 0 . 9745 .0001 .0017 9. FAS 02 30TL6,-Y -Z 0. J. .0000 .2024 .0002 FAS/AM/DA IF. +Y-10 0. 9. 0. 0. FAS/AM/DA IF. +? .0013 .0003 11 -. 2000 9. Э. 12 .0001 .0001 .0020 0. Э. o C FAS/AM/DA IF. -Y 1 3 FAS/DA IF. -Y -Z .0001 -. 0000 .0000 Э. 0. 0. 14 .0012 .0003 .0000 0 . 0. FAS/AM TF, -7 ŋ. .0000 0. FAS/DA IF, 15 .0001 +Y -Z .0005. J . 0. .0003 .0002 .0008 .0002 .0012 AM TUNNEL/SHEAR WB 15 . 3314 . 8454 AM TUNNELISTS IF 17 .0019 .0108 .0001 .0006 .0093 18 .0291 .0067 .0007 .0013 .0018 .0010 MDA/STS INTERFACE 10 .1019 .0110 .0038 .0009 .0001 -.000ū MOA CONE/CYL-ITREC 20 -.0000 0. 0. NZ TANK, +Y, LOWER .0148 .0000 0. N2 TANK, FY, UPPER 0. . 1164 .0000 .0000 0. 21 3. 0. 0. N2 TANK, +Z. LOWER 22 .3031 .0001 .0003). 0. TANK. +Z. UPPER 23 .0001 .0004 .0001 Э. 0. 74 ŋ. .0032 .0002 .0003 0. 0. N2 TANK -- Z. LOWER N2 TANK, -Z, UPPER 25, .0095 .0000 .0000 0. 9. 0. 25 .0003 CM, FWD BULKHEAD .0144 .0030 .0025 .0016 -.0004 クゴ .0038 .0057 CM, AFT BULKHEAD .0271 .0003 .0001 .0608 SM, FWD BULKHEAD 28 .0021 .0003 .0014 .0195 .0010 .0011 .0023 29 .0020 .0035 .0051 .0528 .0460 SM, AFT BULKHEAD 70 .0009 .0081 LOWER D LATCH. DA .0003 0. 0. 0. 0. 71 .0028 .0033 0. 0 . LOWER +Y TRUNNION .0113 LOWER -Y TRUNNION 32 .0007 .0018 .0003 0. 0. 0. 33 -.0000 . 1106 .0000 0. 0. 0. EREP PACKAGE C.G. 74 .1287 .0237 . 2498 0. 0. 0. ATM PV 5,7 IF, OUTR 35 . 0943 .0056 .0294 0. ATM PV 4,5 IF, OUTR 0. 0. 8,1 TF, OUTR 76. .3613 -.0006 .0001 0. J. ATM PN Э. **₹**7 0. AT M PN 2.3 -.0004 .0013 0. 0. IF, OUTR .0151 .0015 .0282 5.7 **78** .0066 Э. G. υ. ATM PV TF. INNR 30 -.0910 .0001 .0122 0. 0. ATM PN 4.5 IF. INNR 0. .0246 .0037 €. ATM PV 8.1 TF, INNR 40 .0019 0. 0. ATM PN 2,3 IF, INNR -. 2204 .0057 .0048 0. 0. 41 .0000 42 -.0000 .0085 -.0000 .0000 CMG, -Y SIDE .0002 .0000 CMG, +Y SIDE 43 .0032 . . 0000 .0009 .0000 .0001 -. 0005 .0000 .0000 .0001 CMG. +X SIDE 44 .0021 .0010 .0008 ATM SAS. PN 1 LE .0008 n. J . 0. 9. G. 0. 45 .0084 .0004 0. ATM SAS, >N 3 0. 47 ATM SAS, PN .0000 .00:00 0. J. 0. J. 5 0. .0000 0. ATM SAS, PN 7 4R .0000 0. 0. 60 .0375 .0032 .0027 .0375 SPAR CENTER .0051 .0166 = 0 .0058 .0209 .0046 .0055 .0048 GRAZCAN CENTER . 5 3 3 1

.0299

SHM

. 3525

.1600

.3210

.0292

. 1349

TABLE A-13 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. DE		IEST	FREQUE	NCY =	1.74 HZ.	:
COMPONENT	GM C	GM C	GMC	GMC	GMC	GM .C
NAME	(ØX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OMS SKIRT/IU/FAS	.0248	.0011	.1103	.0000	.0178	.0001
6-FAS 02 TANKS	.0157	. 3004	.0127	C •	0.	0.
MDA/STS/AM	.0135	.0005	• 00 95	.0001	.0119	.0001
6-AM N2 TANKS	.0043	.0001	.0011	O • _	G.	0.
COMMAND/SERVICE MOD.	. 2283	.0006	.0760	.1304	.6129	.026
DEPLOYMENT ASSEMBLY	.0020	.0141	.0163	G •	0.	0.
ATM-RACK, CMGS, 4-SAS	. 2192	.0064	. 2156	00006	002	
ATM-SPAR CENTER	.0725	.0007	.0253	•9 3 06	.0359	0.
ATH-GRAZCAN CENTER	.0591	.0008	.0319	.0060	.097	.0010
Y.	****	***				
SUM	. 4395	.0245	.4927	.0011	.0384	.0038

BRIONS SKIRT/IU/FAS	.1540
6-FAS 02 TANKS	.0238
MDA/STS/AM	. 1256
6-AM N2 TANKS	.0055
COMMAND/SERVICE MOD.	.1548
DEPLOYMENT ASSEMBLY	.0324
ATM-RACK, OMGS, 4-SAS	.4413
ATM-SPAR CENTER	.1050
ATM-GRAZCAN CENTER	.1825

TABLE A-14 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

3	TEST	AUDE	068	SUN NO.	610	FREQUEN	CY =	1.74
4								
8 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	GMC	GMC	- GMC	" GMC	SMO	GMC		иоо'є
٠ NU •	(nx)	(PY)		(XX)	(T Y)			SCRIPTION
-	0440	0000	0253	- 0000	0407	0.000	חאפר	NG/DWS SKIRT
1 ?	.0118 .0049	.0008 .0001	.0859 .0092	000C .0000	.0104 .0043	• 5000		INTERFACE
3	.0051	.0000			.0031			INTERFACE
4	.0015	.3001	.0027	G .	0.	0.	FAS 03	90TL1,+Y +Z
· =	.0001	.0000	.0023	O •	0 •	0.		BOTL2,+Y +Z
5	2000	0000	.0023	0 • •	0.	0.		907L3,-Y +Z
7 8	.0011	.0000	.0027	0.	0.	0.		2 90TL4,-Y +Z 2 90TL5,-Y -Z
۳ ٥	.0034 .0396	.0001 .0002	.0015 .0005	0. 0.	0.	0.		2 301L5,-Y -Z
10	.0010	.0002	.0003	3.	0.	0.	FAS/A	4/04 TF. +Y
11	3330	.0000	.0002	0.	0.	0.	FAS/A	1/04 IF, +7
12	.0004	.0000	.0003	0.	D •	. ·	FAS/A	4/04 IF, -Y
13	.0003	.0000	.0000	0.	0.			DA TF, -Y -Z
14	.0019	.0000	.0001	9.	0.	0 •		4 IF, -7
1 F	.0003	•0000 •0000	.0003	0. .0000	0.000.2	.0001		DA IF, +Y -Z NNEL/SHEAR WB
15 17	.0023 .0031	.0000	.0018 .0009			.0001		NNEL/STS IF
1.8	1944	.0000	.0025			.0000		TS INTERFACE
13	. 9937	.0004	.0052	.0000	.0001			ONE/CYL ITREC
50	.0009	.0000	.0004	o •	0.	J .		NK, +Y, LOWER
21	. 1005	.0000	.0002	J.	0.	0.		NK, +Y, UPPER
22	.0001	•.0000	.0002	∂•	0.	0.		NK, +7, LOWER
23 24	.0002 .0013	•0000 •9900	.0000 .0003	0. 3.	0.	0 •) •		NK, +Z, UPPER NK -Z, LOWER
25 25	.9913	.0000	.0000	J.	0.	0.		NK, -Z, UPPER
25	.0849	.0002	.0053		.0094			AD BULKHEAD
27	.0050	.0001	.0000		.0003	0000	-	FT BJEKHEAD
23	.0104	.0000	.0001	.3901	.0002	.0023		AD BULKHEAD
<u>5</u> 0	.0071	.0002	.0639	.0001				ET BULKHEAD
30 31	.0015 .0032	.0000 .0057	.0121 .0012	3 • 0 •	0. 9.	3. 0.		D LATCH, DA +Y TRUNNTON
33 3.r	.0002	.0057	.0029	0 • 0 •	0.	0.		-Y TRUNNION
33	0000	.0000	.0001	0.) .	0.		PACKAGE C.G.
34	.0319	.0022	.0348	9.	0.	0.		4 5,7 IF, OUTR
रद	.1321	.0004	.0251	J •	0.	0.	ATM P	
35	, ne 93	.0001	.0077	0 •	0 •	0.	ATM P	
3 O	6.0334	0006	0000	9•	0.) i	ATM D	
<u>38</u> 70	.0080 .0993	0900	.0498 .0115).).	0.	0. 0.	ATM P	N 5,7 IF, INNR [®] N 4,5 IF, INNR
4.0	·C183	.0017	.0102	0.).	G.		N 8,1 IF, INNR
41	.0018	0001	.0049	J .	0.	0.		1 2,3 IF, INNR
42	.0023	.0000	.0064	0000	• 3000	0000		-Y SIDE
43	.0063	.0000	.0052	0000				+Y SIDE
44	.9936	. 00 0 2	.0009	.0000				AX SIDE
45	.0011	.0011	0.	0 •	0.	0 •		AS, PN 1
45 47	.0010 .0001	.0010 .0001	0. 0.). O.	0. 0.	0 • 0 •		AS, PN 3 AS, PN 5
4.8	.0001	.0001	0.	0.	0.	0.		AS, PN T
49	.0725	.0007	.0253		.0059			DENTER
50	.9591	.0008	.6319	.0000	.0097	.0010		AN GENTER
MLP	. 4395	.n245	.4927	.0011	.0384		- 3	

TABLE A-15 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 07		TES	T FREQUE	NCY =	2.51 HZ.	
COMPONENT	GM C	GM C	GMC	GMC	GMC	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS, SKIRT/IU/FAS	.0027	. 0339	.0183	.1284	.5000	.0335
5-FAS 02 TANKS	.00,62	.3270	.0391	C .	0.	0.
MDA/STS/AM	.0001	. 3867	.0005	.0237	.0301	39
6-AM N2 TANKS	.0811	.0096	• 00 32	ι.	0.	0.
COMMAND/SERVICE MOD.	• 60 03	• 1740	.0009	.0861	0001	.6106
DEPLOYMENT ASSEMBLY	.0073	.0249	0002	0.	0.	0.
ATH-RACK, CHGS, 4-SAS	.6152	.12.70	.0364	.0002	.000	.0061
ATM-SPAR CENTER	.0000	.3417	0000	.0379	. 6990	0.
ATH-GRAZCAN CENTER	.0001	.9378	. 00 00	. : 110	5006	.0012
•						
SUM	.0331	•5621	.0983	. 2573	.6301	.0493

BRIOWS SKIRT/IU/FAS	.2169
6-FAS 02 TANKS	.0723
MDA/STS/AM	.1149
6-AM N2 TANKS	.0134
COMMAND/SERVICE MOD.	.2719
DEPLOYMENT ASSEMBLY	.0326
ATM-RACK, CMGS, 4-SAS	.1789
ATM-SPAR CENTER	.0496
ATM-GRAZCAN CENTER	.0501

TEST MODE 07A RUN NO. 431 FREQUENCY = 2.51

มูกกร	e do	GMC	GMC	ēŵc	ୢୢୢୢୢୢୢୢୢୢୢୢ୷	GMC	
MO.	(DX)	(DY)	(07)	(TX)	(YT)	(TZ)	DESCRIPTION
4	0.000	0200	0004	. 3681	. აიიი	0.4.20	DASE BUCKBUS SKIDI
1	.0000	.0200	.0001				BASE RNG/OWS SKIRT
- 	.0000	9001	.0061	.0223	3000		OWS/IU INTERFACE
	0000	.0005	.0057	.0380	•0000		IU/FAS INTERFACE
4	.3918	0000	.0117	9.)	3.	3 •	FAS 02 BOTL1,+Y +Z
5	.0013	.0021	.0043	0.	0.•	0.	FAS 02 BOTL 2, +Y +Z
5	. 0006	.0016	.0028	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	• 1003	.0000	.0079	0.	0 •		FAS 02 BOTL4,-Y +Z
	• 9 0 2 0	.0083	.9105	3.	0 •	0.	FAS 02 BOTLE, -Y -Z
3	7 2 3 1	.0149	.0019	0 ↔	0.	3 • 1	FAS 02 907L6,-Y -Z
1.0	.0012	.0012	.0349	a •	0 •	0.	FAS/AM/DA IF, +Y
11	.3001	.00.21	.0001	0 •	0 •	0.	FAS/AM/DA IF, +Z
12	.0912	.0024	00.75	0 •	, 0 •	0.	FAS/AM/DA IF, -Y
<u>1</u> 3	.0001	.0015	0004	0 •	0 •	0.	FAS/34 IF, '-Y -Z
14	3030	.0059	.0000	3 ·	0.	3.	FAS/AM IF, -Z
1 7	.9001	.0005	₹0001	Û.•	0.	0.	FAS/DA TF, +Y -Z
15	•0000.	•0715	.0000	.0023	0000	.0004	AM TUNNEL/SHEAR WB
17	3888	.0106	.0001	.0077	.0000	.0059	AM TUNNELISTS IF
1.8	.0001	.0235	0001	.0690	.0001	0021	MDA/STS INTERFACE
. 10	.0000	9510	.0003	.0047	0000	0003	MDA CONE/CYL ITREC
23	.0001	.0004	0016	J •	0.	0.	N2 TANK, +Y, LOWER
21	.0003	.0010	· 0017	0.	0.	0 •	N2 TANK, +Y, UPPER
22	.0000	.0002	.0000	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0003	.0000	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0004	.0027	.0000	ŋ .	0.	3 •	NZ TANK -Z, LOWER
25	.0000	.0245	.0000	0.	0.	0.	NZ TANK, -Z, UPPER
25	3000	.9578	.0000	.0085	.0000	.0007	CM, FWD BULKHEAD
27	.0704	.0181	.0009	.0144	0000	.0028	CM, AFT BJEKHEAD
28	0601	.0050	.0000	0258	.0000	.0001	SM, FWD BULKHEAD
29	0001	.0931	.0000	.0365	0001	.0072	
30	. 1001	.0263	.0000	0.	9.	0.	LOWER D LATCH, DA
31	.0752	0008	0001	3.	0.	0.	LOWER +Y TRUNNION
30	.0023	0008	0302	3 •	0.	0.	LOWER -Y TRUNNION
33	0000	.0002	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	0003	.0156	.0007	0.	8.	0.	ATM PN 6,7 IF, OUTR
	.0010	.0150	.0119	0.	0.	9.	ATM PN 4,5 IF, OUTR
35	.0042	.9228	.0097	0.	0.	0.	ATM PN 3,1 IF, OUTR
77		.n=51	.0008		0.	0.	ATM PN 2,3 IF, OUTR
7.0	.9312			9 • a	3.	0.	ATM PN 5,7 IF, INNR
30	.0001	0001	.0002	0.			• • •
	.0025	0001	.0019	0.	0.	0.	· · · · · · · · · · · · · · · · · · ·
មហ្	.0134	.0024	.0050	0.	0.	O.	ATM PN 8,1 IF, INNR
41	.0905	.0081	.0003	J.		0.	ATM PN 2,3 IF, INNR
47	.0007	.0012	.0030	.0000	0630	.0000	CMG, -Y SIDE
43	.0007	.0012	.0027	.0001	.0000	.0000	CMG, +Y SIDE
44	0000	.0036	0000	.0001	.0000	. 0000	OMG, +X SIDE
4 =	.0903	.0003	0.	0.	0.	0.	ATM SAS, PN 1
46	.0003	• 11 10 3	0.	0.	0 • .	0.	ATM SAS, 2N 3
47	.0003	.0003	0.	J •	0.	0.	ATM SAS, PN 5
l _a n	.0003	.0003	0.	0.	0.	J.	ATM SAS, PN 7
49	.000	.0417	00C0	.0079	• 0000		SPAR CENTER
= 3	.0001	• 0 3 3 8	.0000	.0110	• 0 0 0 0		GRAZGAN CENTER
PLS	.9331	.5621	.0983	.2573	.0001	.0493	

TABLE A-17 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 08A	TEST FREQUENCY = 3.06 HZ.					
COMPONENT	GM C	GNC	GM C	GMC	GM C	GM C
NA ME	(BX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BRIOWS SKIRT/IU/FAS	.0072	. 2000	.0177	.6906	.0070	.0015
5-FAS 02 TANKS	.0344	. [] 23	.0060	n.	. 0.	3.
MDA/STS/AM	.0008	.0001	.1888	0001	.[324	.0092
5-AM N2 TANKS	.0005	.0000	. 0730	0.	S •	0 •
COMMAND/SERVICE MOD.	.0064	.0902	. 36 11	.0302	.6158	.6008
DEPLOYMENT ASSEMBLY	.0006	。J135	.0077	0.	0.	0.
ATM-RACK, CMGS, 4-SAS	.0066	.3317	.1986	.0001	3003.	0000
ATM-SPAR CENTER	.0015	.0091	.0441	.0002	. 6004	0.
ATH-GRAZCAN CENTER	.0016	.0002	.0361	0000	. 00 0 6	.0000
				e> <= <= <=		
SUM	.0596	. 182	.8530	.0303	.1562	.0026

BRIOWS SKIRT/IU/FAS	. 9334
6-FAS 02 TANKS	.0427
MDA/STS/AM	.2223
6-AM N2 TANKS	.0635
COMMAND/SERVICE MOD.	.3845
DÉPLOYMENT ASSEMBLY	.0218
ATM-RACK, CMGS, 4-SAS	.2070
ATM-SPAR CENTER	.0454
ATM-GRA/CAN CENTER	.0385

TABLE A-18 SEMERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

RUN NO. 452

FREQUENCY =

3.05

TEST MODE

SUM

.0596

.0182

.8630

.0003

.3562

.0041

08 A

GMC GMC GMC GMC NODE MUJE GMC GMC (TY) (TZ) DESCRIPTION NO: (DX) (DY) (DZ) (TX) .0005 .0001 .0149 .0000 .0055 .0000 BASE RNG/DWS SKIRT -0013 .0003 .0004 OWS/IU INTERFACE 2 .0000 .0000 .0006 .0011 TU/FAS INTERFACE 3 .0937 .0000 -. 0000 -.0000 -.0092 .0003 .0005 0. 0. FAS 02 30TL1.+Y +Z .0001 0. 0. 7 FAS 02 90TL2,+Y +Z 0. .0007 .0003 .0015 0. .0015 0. FAS 02 5 .3312 .0005 3. J. 30TL 3.-Y +Z .0003 .0008 0. 9. FAS 02 30TL4,-Y +Z .0002 J. FAS 02 30TL5,-Y -Z Ą 0. 0. -.8915 .0004 .0009 0. a FAS 02 BOTL6,-Y -Z 0. . 0 339 .0003 .0005 0. O . .0001 0. 0. FAS/AY/DA IF, +Y 19 .0001 .0000 Ð. 0. . 3511 .0000 0. FAS/AM/DA IF. +Z/ 11 .0019 O . 0. FAS/AM/DA IF, -Y 12 .0001 -.0900 .0005 0. 0. FAS/DA IF. -Y -Z 9. 0 . -.0002 -.0000 13 .0000 3. 0. .3005 .00.01 .0001 FAS/AM TF. -7 14 9. 0. 0. 0. FAS/DA IF, 15 -.0000 .0000 +Y - 7 .0000 0. .0007 .0000 15 .0001 .0000 .0005 .0000 AM TUNNEL/SHEAR WB 47 .0075 .0000 .0015 .0000 AM TUNNELISTS IF .0002 .0000 .0004 .0535 .0291 .0003 MOA/STS INTERFACE 18 -.0000 -.0000 -.0000 -.0001 .0021 MDA CONE/CYL ITREC 19 .0001 .0901 .1273 .0001 20 **J**• 0. 0. N2 TANK, +Y, LOWER .0000 .0000 NZ TANK, +Y, UPPER 21 .0000 .0000 .0304 0. 0. 0. 22 0. 0. 0. N2 TANK. +Z. LOWER .9991 .0000 .0004 N2 TANK. +7. UPPER 23 0. .0303 .0000 .0009 0. 0. 0. 24 N2 TANK - Z, LOWER .0003 .0000 .0004 0. 0. N2 TANK. -Z, UPPER 25 0. .0000 .0000 . 00 0 B 0. 0. .0004 .0003 CM, FWD BULKHEAD .0041 25 .0016 .0000 .1309 27 -. 0001 -.0005 -.0000 CM, AFT BULKHEAD .0006 .0001 .0753 -.0000 .0004 28 .0935 -.0000 .0185 .0031 SM, FAD BULKHEAD 29 . 2337 .0000 .1363 -.0001 .0091 .0002 SM. AFT BULKHEAD 33 Û. LOWER D LATCH, DA -.0001 .0000 .0071 0. J. .0004 0. 31 .0066 -.0000 9. 0. LOWER +Y TRUNNION ۲2 .0003 .0069 -.0000 0. 0. LOWER -Y TRUNNION 0. .nnoa .0007 EREP PACKAGE C.G. 33 .0000 U. 9. 0. 34 0. 0. ATM PN 5,7 IF, OUTR -.0001 .0007 .0481 3. 0. 35 ATM PN 4.5 IF.OUTR .0014 .0004 .0183 0. 0. .0007 35 .0002 .0177 0. 0. ATM PN 8,1 IF, OUTR 0. 77 .0010 0. ATM PN -.0000 .0203 0. 0. 2.3 IF.OUTR ATM PN 5,7 IF, INNR 38 G. -.0001 .0001 .0308 0. 0. **3 Q** ATM PN 4,5 TF, INNP . 2001 .0000 .0099 0. ð . J . ATM PV 9,1 IF, INNR 41 .0315 .0000 .0151 0.1 0. 0. .0008 0. ATY PN 2,3 IF, INNR 41 .0000 . G182 J . Э. 42 .0000 .0000 CMG, -Y SIDE .0003 .0072 -.0000 -.0000 -.0000 43 .0000 -.0000 CMG, +Y SIDE .0093 -.0000 .0061 .0005 .0000 .0000 .0000 44 .0058 .0000 CMG, +X SIDE 45 ATM SAS, PN 1 -. 9 000 -.0000 O. O. 0. 9. 45 -.9991 ATM SAS. PN 3 - . 0961 0. ΰ. 0. G. 47 ATM SAS, PN 5 .0002 .0002 0. 0. 0. 0. 0. .0001 .0001 0. LA ATM SAS. PN 7 0. 0. 49 .0015 .0001 .0441 .0002 .0004 .0015 SPAR DENTER Fn .0016 .0902 .0361 -.000.0 .0006 .0000 GRAZCAN CENTER -----------------------

TABLE A-19 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 09A		TEST FREQUENCY = 4.10 HZ.				
C OMPONE NT	GMC	GMC	GMC	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.9332	.0359	.0152	•0539	630û	.(009
6-FAS 02 TANKS	.0004	• 3299	• 92 37	0.	9.	0 .
MDA/STS/AM	.0000	.3005	.3003	.0394	. 0000	.0761
5-AM N2 TANKS	.0001	. 30 07	-0092	C •	9.	0.
COMMAND/SERVICE MOD.	.0032	.0019	.0008	.7972	.()81	.0015
DEPLOYMENT ASSEMBLY	.0008	.0019	• 33 SE	0.	0.	9.
ATH-RACK, CMGS, 4-SAS	.0169	.0114	.0073	.1001	.0000	.0000
ATH-SPAR CENTER	.0000	.0037	.8998	.0121	.6000	0.
ATH-GRAZCAN CENTER	. 5000	.0005	. 23 36	.0028	.0000	.0069
	**** *** ***					
SUM	.0215	. 05 34	.04.91	.8755	.0001	.0094

BR/OWS SKIRT/IU/FAS	.0761
6-FAS 02 TANKS	.0540
MDA/STS/AM	.0163
6-AM N2 TANKS	.3019
COMMAND/SERVICE MOD.	.8047
DEPLOYMENT ASSEMBLY	.0053
ATM-RACK, CMGS, 4-SAS	.0356
ATM-SPAR CENTER	.3028
ATM-GRA/CAM CENTER	.0943

TABLE A-20 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE FREQUENCY = 09A RIIN NO. 443 4.13 GMC GM C NODE GMO GMC GMC GMC NODE <u> vn</u> (TX) () **(**) (DY) (D7) (TY) (TZ) DESCRIPTION .0005 . 1324 .0000 .0000 .0000 .0001 BASE RNG/DWS SKIRT .0000 ? .0000 .0000 -.0000 .0113 .0001 OWS/TU INTERFACE , र . 3000 - . 0000 .0012 .0232 -.3030 .0307 IU/FAS INTERFACE .0000 .0335 0. 4 .0054 0. 0. FAS 02 307L1,+Y +Z Ξ .0000 .. 0082 .0027 0. 0. 0. FAS 02 301L2.+Y +Z .0000 .0061 .0021 FAS 02 30TL3,-Y +Z 0. 0. 0. 7 . 9990 .0134 .0056 FAS 02 907L4.-Y +Z 0. ŋ. **]** • 0. R .0002 ð. .0024 .0052 ા ∙ FAS 02 BOTLE, -Y -Z a .0963 .0000 .0019 J. 0. 0. FAS 02 30TL6,-Y -Z .0100 19 .0000 .0015 0. 0 . . FAS/AM/DA IF. +Y 3. FAS/AM/DA IF, +Z 11 -.0000 .0039 .0000 0. 0. Э. 12 .0023 .0001 .0000 3. FAS/A4/DA IF, -Y 0. 0. 1.7 .0000 .0004 -.0001 0. 0. 0. FAS/DA IF, -Y -Z 14 -.0000 .0010 -.0000 FAS/AM IF. -7 Э. 0. C. 15 0. FAS/DA IF, .0000 .0001 .0001 0. 0. +Y -Z 15 .0000 .0000 .0000 .0002 .0000 .0000 AM TUNNEL/SHEAR HB 17 .0000 .0301 .0001 .0020 .0043 AM TUNNELISTS IF • 0.0 0 0 .0000 19 .0000 -.0000 .0037 -.0000 .0017 MDA/STS INTERFACE 19 .0000 .0005 .0035 -.0000 .0002 .0001 MDA CONE/CYL ITRFC 20 -.0000 .00.00 .0002 3. 0. J. N2 TANK, +Y, LOWER 21 .0000 .0000 .0000 0. 0. O. N2 TANK, +Y, UPPER .0000 22 N2 TANK, +Z, LOWER .0003 .0000 ŋ. 0. 0. 27 .0000 .9701 .0000 0. 0. N2 TANK, +7, UPPER o. 24 . 3000 .0102 .0000 . 0 . N2 TANK ŋ. -Z. LOWER G. 25 .0000 .0000 .0000 N2 TANK, -7, UPPER 0. ŋ. 0. 25 .0000 .0002 .0009 -.0001 .0829 .0000 CM, FWD BULKHEAD 27 .0004 -.0001 .0028 .1376 .0001 .0000 CM, AFT BULKHEAD .2353 28 .0025 .0000 -. 0008 -.00000 .0014 SM, FWD BULKHEAD 20 .0000 .0011 -.0012 . 3415 .0000 -.0000 SM, AFT BULKHEAD 7.3 .0000 .0002 .0000 0. 0. 0 . LOWER O LATCH, DA .0008 .0001 0. 0. 31 .0013 0. LOWER +Y TRUNNION 32 .0000 -.0000 .0012 3. LOWER -Y TRUNNION 0. **J**. 33 .0017 .0000 .0000 3. 0. **)** . EREP PACKAGE D.G. 74 .0011 -.0000 .0001 ATM PN 5,7 IF, OUTR 0. 0. 3. 33 .0170 .0006 .0019 0. Û. Э. ATM PN 4,5 IF, OUTR 35 .0022 .0011 .0314 ATM PN 8,1 3. 0. 0. IF, OUTR 77 .0003 .0037 -.0000 ATM PN 1 0. 9. 2,3 TF, OUTR 72 . 1115 ATM PN 5,7 .0052 .0000 0. 9. J. IF, INNR 70 .0004 .0009 ATM PN 4,5 IF, INNR .0009 0. 0. 0. .0016 40 -.0003 .0013 ATM PN 8.1 /IF. INNR 0. 9. 0 . .0004 9. 0. 4 -.0000 .0001 ŋ. ATM PN 2,3 IF, INNR 42 .0003 .0001 .0007 .0000 .0000 .0000 CMG, -Y SIDE 43 . 6004 .0005 .0000 CMG, +Y SIDE .0001 •0000 -.0000 44 .0000 .0000 .0000 -.0000 .0000 .0000 CMG, +X SIDE 45 -.0000 -.0000 0. ATM SAS. PN 1 n. 0. 0. 65 . 1110 ATM SAS, PN 3 .0000 G. ŋ. ŋ. ŋ. 47 -.0000 0. 0 . ATM SAS, PN 5 -.0100 0. 0. -.0010 6.0 -.0000 0. 9 . n. 2. ATM SAS, PN 4 7 . 8000 .0000 .3521 .0000 SPAR CENTER .0007 .0000 × 5 .0005 .3000 . 3000 .0000 .0028 .0009 GRAZCAN CENTER _----------------

SUM

.0215

.0534

.0401

. 9755

.0001

.0094

TABLE A-21 ORBITAL CONFIGURATION HODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 16A	TEST FREQUENCY = 4.50 HZ.					
C OMPONE NT	GM C	GM C	GM C	GMC	GM C	GMC
NAME	(BX)	(DY)	(DZ)	(X T)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	. 0004	. 0115	.0133	.0209	.0001	.0044
6-FAS 02 TANKS	. no 18	. 3315	.02 11	0.	ΰ.	0.
MDA/STS/AM	.0000	.0352	.0001	0006	6000	.0060
S-AM NO TANKS	. 0000	.0003	.0008	0 •	Э.	0.
COMMAND/SERVICE MOD.	.0000	• 1116	.0010	• [29[.0000	.0042
DEPLOYMENT ASSEMBLY	.0222	. ú054	.0025	Û.	9.	0.
ATM-RACK, CMGS, 4-SAS	. 1477	. 3392	.1462	.6069	0000	.0006
ATM-SPAR CENTER	.0004	0000	0300	.0455	.0006	0.
ATM-GRAZCAN CENTER	.0003	.0005	.0300	.0485	.0003	.0269
·			***			
SUM	. 1528	• 4752	· 1840	.1449	.0010	.0420

BR/OWS SKIRT/IU/FAS	.0506
6-FAS 02 TANKS	.0235
MDA/STS/AM .	.0412
6-AM N2 TANKS	.9911
COMMAND/SERVICE MOD.	.1459
DEPLOYMENT ASSEMBLY	.0101
ATM-RACK, CMGS, 4-SAS	• 60 46
ATM-SPAR CENTER	. 9465
ATM-GRAZCAM CENTER	.0765

TABLE A-22 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 10 A PUN NO. 482 FREQUENCY = 4.51 --- GMC-----. **G40** GMC G.M.C - NODE -NADE GMC GMC NO. (XU) (DY) (D7) (XX) (TY) (T7) DESCRIPTION .0001 .0099 .0019 .0025 PASE RNG/DHS SKIRT .0001 .0142 1 .0027 .0000 .0007 OWS/IU INTERFACE 2 -.0330 .0003 .0008 .0039 3 .0056 -.0000 .0011 IU/FAS INTERFACE .0000 .0000 FAS 02 BOTL1,+Y +Z .0000 .0049 G. 0. 4 .0009 0. 0 . . ~ 0. 0. FAS 02 BOTL 2.+Y +Z .0009 .0017 .0001 E45 05 --0000 0. BOTL 3. -Y +Z .0006 .0009 0. o . ? 0. FAS 02 BOTL4,-Y +Z -.0000 . 1116 .0031 0. 0. ŋ. FAS 02 907L5,-Y -Z 8 .0003 .0000 .0C73 1. 0. -.9990 .0023 0. 0 . FAS 02 30TL6.-Y -Z Э -.0000 0. FAS/AM/DA IF. +Y 10 .3002 .0000 .0019 0. 0. 0. FAS/AM/DA IF, +7 0. -. 7730 .0010 .0000 ŋ. 0. 11 ũ. .0029 0. FAS/AM/DA IF. -Y .0001 ŋ. 12 .0000 FAS/DA IF. -Y -Z 9. 13 -.0000 .0002 .00C7 3. 0. 14 .0000 -.0000 -.0000 0. 0. FAS/AM IF. -7 0. FAS/DA IF. +Y -Z 1 = .0001 . 2000 .0003 ŋ . 0. .0000 .0000 AM TUNNEL/SHEAR WB .0000 15 .0001 .0001 .0000 17 .0008 AM TUNNELISTS IF .0001 .0000 .0001 -.0000 . 7700 .0000 .0048 MDA/STS INTERFACE 18 . 0000 .0056 .0000 -.0001 .0001 .0004 MOA CONEZCYL ITREC 19 -.0000 .0294 -.0001 -.0000 NZ TANK, +Y, LOWER 0. J. 20 .0000 .0000 .0005 0. 0. 21 .0000 .0003 0. NO TANK, TY, UPPER .0000 0. N2 TANK, +Z, LOWER 22 .0000 .0001 0. .0000 0. G. N2 TANK, +Z, UPPER 23 .0000 .0001 .0000 9. 0. J . 9. NS TANK -7, LOWER 24 .0000 .0000 .0000 J. 0. N2 TANK, -Z, UPPER 25 0. .3000 .0000 .0003 J . -.0000 CM, FHD BULKHEAD 25 . 3034 .0002 -.0000 .0451 -.0000 .0000 .0011 .0060 -.0002 CM, AFT BULKHEAD 27 .0000 .0207 .0002 SM. FWD BULKHEAD 28 .0001 .0097 -.0000 .0059 .0000 .0000 .0039 SM, AFT BULKHEAD 29 -.0000 .0351 -.0000 .J127 .0000 0. LOWER O LATCH, DA 30 .0041 .0002 0. 0. 71 0. LOWER +Y TRUNNION .0013 .0006 .0015 0. 0. 0. LOWER -Y TRUNNION 32 .0001 .0007 0. .0008 0. EREP PACKAGE C.G. 33 .0303 -.0005 .0000 0. 0. 0. .0191 .0017 ŋ. ATM PN 5.7 TF.OUTR 7.4 .0006 9. 0. 7 5 4,5 IF, OUTR .0002 Ú. 0. ATM PN .0314 .0372 0. 36 .0316 .0059 0. 9. 0. ATM PN 8,1 IF, OUTR .0318 PV 37 ATM 2,3 IF, OUTR .0073 .0422 .0017 O. 0. 0. 0. 78 . (111 .1861 .0033 Э. 9. ATM PV 5,7 IF, INNR ATM PV 7.7 .0292 .0300 . G147 C. Û. 3. 4,5 IF. INNR .0295 ŋ. ATM PN 3,1 40 .0198 .0013 3. 0 . IF, INNR O. ATM PN 2.3 41 -.0012 .0178 .0019 ŋ. IF. INNR ムつ .0002 .0000 .0001 CMG, -Y SIDE .0073 .0107 .0071 .0078 -.0000 43 .0095 .0129 .0005 .0003 CMG, +Y SIDE .0002 .0000 .0002 CMG, +K SIDE 44 .0000 .0001 .0001 ATM SAS, 45 .0003 .0003 0. 0. 0. 3. 3N 1 ATH SAS, 9. 45 ŋ. ο. JN 3 .0003 .0003 0. ATM: SAS, PK 5 0. 47 .0003 .0003 0. 0. 0.

48

49

5 9

8114

.0003

.3004

.0003

. 1528

.0093

.0005

.4752

-.0000

0.

-.0000

.0000

.1840

0.

. 0455

. 9485

. 1449

G.

.0005

.0003

.0010

0 .

. 0424

ATM SAS. PN 7

.0004 SPAR CENTER

.0269 GRAZCAN DENTER

TABLE A-23 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 108		TEST FREQUENCY = 4.55 HZ.					
C OM PONÉ NT NAME	GM C (D X)	GMC (DY)	GNC (DZ)	GMC (TX)	GM C (T Y)	GMC (TZ)	
BRIONS SKIRT/IU/FAS	.0004	.0102			.0000	.045	
5-FAS 02 TANKS MDA/STS/AM	.0023 .0000	.0013 .0367	•0207 • 1002	0. 6000		.068	
5-AM N2 TANKS	.0000	.0002	.0008	0.	0.	0.	
COMMAND/SERVICE MOD.	0000	. 1127	. 00 11	€653.		.6937	
DEPLOYMENT ASSEMBLY	.0025	. 9855	.0033	0.046	0.	0.	
ATM-RACK, CMGS, 4-SAS ATM-SPAR CENTER	.1468 .0006	.3103 9000	.1478 .0000	.010 .0478		.0007	
ATM-GRAZCAN CENTER	.0001	.0003	. 20 00	•0 +23		.0273	
	***			••••	` -		
SUM	. 1528	.4772	.1870	.1394	.0006	.0430	

BRIONS SKIRT/IU/FAS	.0500
6-FAS 02 TANKS	.0243
MDA/STS/AM	.0436
6-AM N2 TANKS	.3011
COMMAND/SERVICE MOD.	.1441
DEPLOYMENT ASSEMBLY	.0113
ATM-RACK, CMGS, 4-SAS	.6066
ATM-SPAR CENTER	049r
ATM-GRA/CAM CENTER	.9701



TEST MODE 108 RUN NO. 619 FREQUENCY = 4.55

	640	GMC	- GMC	GMC			
4 0~	(ĐX)	~ (ŋŸ)~	(02)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0087			.0000		BASE RNG/DWS SKIRT
?	-•0000	• 8 1 3 4					OWS/IU INTERFACE
7.3	. 2022	•0000	.0063	.0039		.0009	
4	.0912	• 0000	.0045	0.	9 •		
5	0000	.0005	.0025	0.			FAS 02 BOTL 2,+Y +Z
5	.0002	0008	.0013	0.			FAS 02 30TL3,-Y +Z
7	.0005	0000	• 00 32	0 •	0.		FAS 02 BOTL4,-Y +Z
Ŗ	.0905	•0000	.0075	0.	0.	a .	FAS 02 30TL5,-Y -Z
ď	0300	\bullet 0000	.0017	3.	3.		FAS 02 30TL5,-Y -Z
10	.0002	.0000	.0017	0.	0 •		FAS/AM/DA IF, +Y
-11	0000	.0008	.0000	0.	0 •	0.	FAS/AM/DA IF, +Z
12	• 3962	.0001	.0027	J.	0 •	0.	FAS/AM/DA IF, -Y
13	0000	.0003	• 000 9	9.	0.	0.	FAS/JA IF, -Y -Z
14	0000	0000	0000	0.	G •	0 •	FAS/AM IF, -Z
15	• 7 7 7 1	.0001	.0004	0.	0.	0 •	FAS/DA IF, +Y -Z
15	•0000	.0000	.0002	.0000	.0000	.0001	AM TUNNEL/SHEAR WB
17	.0000	.0001	.0000	.0001	.0000	.0009	AM TUNNEL/STS IF
18	• 0083	.0063	.0000	0001	0000	.0052	MDA/STS INTERFACE
19	.0000	•0₹02	.0000	0001	3000		MDA CONE/CYL ITRFC
53	. 5550	•0000	.0005	9 •	0.		NZ TANK, +Y, LOWER
21	• 0 7 0 0	• 0000	.0003	0.			N2 TANK, +Y, UPPER
2.2	• 00,03	.0901	• 0000	J.			N2 TANK, +Z, LOWER
23	`. 1000	.0001	.0000	0.			N2 TANK, +Z, UPPER
24	• 0 0 0 0	.0000	. 0000	3.	0 •	ŋ •	N2 TANK -7, LOWER
2=	.0000	.0000	.0000	0.	0.	0.	
25	0700	.0482	0000	.0035			CM, FWD BULKHEAD
27	0000	.0217		•0063			CM, AFT BULKHEAD
. 29	• 0 0 0 0	.0113	.0000	.0039			SM, FWD BULKHEAD
29	0000	.0315	0000				SM, AFT BULKHEAD
30 ,	.0000	.0047		0 •			
71	.0014	• 0003	.0023	j.			LOWER +Y TRUNNION
2.5	. 9719	0001	.0008	D •			LOWER -Y TRUNNION
र र	.0900	.0006	.0000	C •		9 •	EREP PACKAGE C.G.
24	.0005		.0020	<u>j</u> .	0.	0.	ATM PN 6,7 IF, OUTR
75	.0318	.0002	.0365	0.	0 •	9 •	ATM PN 4,5 IF, OUTR
35	• 9330	.1057	.0326	0.	0.	0 •	ATM PN 9,1 IF, OUTR
37	.0071	.0414	.0317	9•	0.	0.	ATM PN 2,3 IF, OUTR
₹ ₿	.0103	.1862	.0043	0.	0.	0.	ATM PN 6,7 IF, INNR
3.3	0295	.0319	.0146	0.	0.	0.	ATM PN 4,5 IF, INNR
4.0	.0179	.0021	.0302	0.	0.	0.	ATM PN 8,1 IF, INNR
41	0011	.0174	.0020	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0975	.0074	.0103	.0002	.0000	.0001	
43	.0.093	.0080	.0127	.0005		.0003	
L4	.0000	.0001	.0001	.0002		.0002	•
45	.0004	.0004	0.	0.	0 •	g .	ATM SAS, PN 1
45	.0003	.0003	0.). 0	0.) • (ATM SAS, PN 3
47	.0004	.0004	0.		.0•	0.	ATM SAS, PN 5
\$ 3 6 0	.0003	- 0003	0.	9	0.005	0.	ATM SAS, PN 7
لي (C) د (C)	.0005	0000	.0003				SPAR CENTER
5.0	.0001	.0903	.0000	.0423	.0001	• 0 2 / 3	GRAZCAN CENTER
SUM	.1528	.4772	.1870	•1394	.0306	. 0436	3

TABLE A-25 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 11	TEST					
COMPONENT	GPI C	GM C	GMC	GMC	GM C	GMC
NAME	(DX)	· (DY)	(9Z)	(X T)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0026	.0002	. 80 26	.0001	.0010	.0000
6-FAS 02 TANKS	.0029	. 00 05	. 20 23	е.	0.	0.
MDA/STS/AM	.0057	. 10 05	.0328	3000.	.0010	.0001
6-AM N2 TANKS	.0010	.0001	. 9900	0.	0.	9 •
COMMAND/SERVICE MOD.	.0173	.0023	.0133	.0000	. 59 0 2	.016
DEPLOYMENT ASSEMBLY	.0006	. 50 93	. 00 99	0.	G •	0.
ATM-RACK, CMGS, 4-SAS	. 3288	.0046	3852 ،	.0330	.3318	.G000
ATM-SPAR CENTER	.0005	.0000	,0148	.0061	. 6869	0 .
ATM-GRAZCAN CENTER	.0002	0330	.0201	0001	.1397	.0003
SUM	• 35 96	. 3176	. 41 99	.6302	. 23 0 7	.0021

BR/OWS SKIRT/IU/FAS	.0066
6-FAS 02 TANKS	.0037
MDA/STS/AH	.0132
6-AM N2 TARKS	.9011
COMMAND/SERVICE MOD.	. 0346
DEPLOYMENT ASSEMBLY	.0197
ATM-RACK, CMGS, 4-SAS	.7215
ATM-SPAR CENTER	.0923
ATM-GRA/CAN CENTER	.1102

A-29
TABLE A-26 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

RUN NO. 536 TEST HOME 11 A FREQUENCY = 5.03 **りつり**に GMC GMC GMC SMC GMC _ GMC NODE vn. (DX) (DY) (07) (TX) (TY) (TZ) DESCRIPTION .0001 .0024 .0031 -.0000 BASE RNG/DWS SKIRT .0012 .0006 .0000 -.0000 .0001 .0000 .0002 OWS/TU INTERFACE . 1004 3 .0000 .0000 .0001 .0003 . . 0 0 0 0 IU/FAS INTERFACE . 9994 .0000 .0000 0. .0001 3. 0. FAS 02 30TL1.+Y +Z 5 0. j. 0. FAS 02 .0001 .0001 .0000 BOTL 2.+Y .0001 0. 5 .0002 0. 0. FAS 02 .0003 BOTL 3, -Y + Z . 2004 .0001 .0000 0. 0. J . FAS 02 301L4.-Y 9 .0017 .0002 .0000 0. 0. 0. FAS 02 BOTL5,-Y 3 .0001 -.0000 0. 0. FAS 02 BOTLS,-Y .0010 0. 1 7 -.0000 0. FAS/AM/DA TF. +Y .0001 .0000 0. 0. .0001 .0000 0. FAS/AY/DA IF, +Z 11 -.0000 9 . 0 . FAS/AY/DA IF, -Y 12 .0004 .0000 .0000 O. 0 . 0. FAS/DA IF. 13 .0000 .0000 -.0000 0. 0. 0. -Y -7 14 .0000 FAS/AM IF. -7 .0002 .0000 0. 0 . 9. FAS/DA IF, 15 .0000 0. . 0000 -.0000 0. +Y -Z 15 .0001 .0000 AM TUNNEL/SHEAR WB .2006 .0000 .0000 .0000 17 .0012 .0001 .0001 .0000 .0091 .0000 AM TUNNEL/STS IF 18 . 9000 MDA/STS INTERFACE .0021 -.0000 .0001 .0005 .0001 . 0000 .0000 19 .0003 MOA CONE/CYL ITREC .0018 . .0003 .0026 29 .0002 .0000 .0000 0. 0 . 0. NZ TANK, +Y, LOWER 21 NZ TANK, +Y, UPPER .0002 .0000 .0000 0. 0. 0. .0000 N2 TANK, +Z, LOWER 22 .0001 .0000 0. 0. 0. 23 .0002 .0000 .0000 0. N2 TANK, +Z, UPPER 0. 0 . 24 0. .0002 .0000 .0000 0. N2 TANK -Z. LOWER 0 . 25 .0001 .0000 .0000 N2 TANK, -Z, UPPER 0. .0000 25 -.0000 -.0000 .0008 .0049 CM, FWD BULKHEAD . 1127 27 -.0000 CM, AFT BULKHEAD .0033 .0008 .0037 -.0000 -.0001 28 .0354 .0003 .0009 .0000 .0002 .0013 SM, FAD BULKHEAD 29 .0158 .0000 .0003 .0004 .0037 .0001 SM, AFT BULKHEAD 39 -.0001 .0003 .0073 0. 0. ŋ. LOWER D LATCH. DA 31 .0037 -.0000 .0007 9. 0. 0. LOWER +Y TRUNNION 32 .0002 .0053 .0010 0. 0. 0. LOWER -Y TRUNNION 33 0. EREP PACKAGE C.G. .0004 .0000 .0009 0. O. 74 .0021 .0014 .1128 0. 9. 0. ATM PN 6,7 IF, OUTR 75 -.0003 .0001 .0013 0. 0. 0. ATM PN 4,5 IF, OUTR 76 .0006 . 0 350 .0062 0. 0. 0. ATM PN 9,1 IF, OUTR 77 .0050 -.0002 .0917 0. 0. ATM PV 2,3 IF, OUTR ٥. 38 .0365 -.0043 .0659 3. ATM PV 0 . 6.7 IF, INNR 73 0. ATM PN 4,5 ŋ. IF, INNR .0896 .0018 -.0001 O. 40 . 2850 .0039 .0069 0. 0. 0. ATM PN 8.1 IF. INNR .0755 ATM PN 2,3 41 .0512 -.0012 0. IF, INNR 0. 42 .0153 .0001 .0007 .0000 .0006 . 1000 CMG, -Y SIDE 43 .0001 .0000 .0007 CMG. +Y SIDE .0125 .0001 -.0000 .0000 44 .0120 .0240 .0005 -.0000 .0000 CMG, +X SIDE 45 .0006 . 01115 0. 0. 0. 0. ATM SAS, PN 45 .0008 .0008 0. 0. 0. 0. ATM SAS, PN 47 .0006 0. 0. ATM SAS, PN •0006 0. 0. 48 .0004 **7** . .0004 ATM SAS, PN 40 .0048 . 1859 .0005 .0000 .0001 .0005 SPAR CENTER 50 -.0000 .0001 .0002 -.0001 .1097 .0003 GRAZCAN CENTER

.4199

.0002

.2007

.0025

.0175

SUM

. 3596

TABLE A-27 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 12	TEST FREQUENCY = 5.86 HZ.					
C OMPONE NT	GMC	GMC	GMC	GMG	GH C	GM C
NAME	(DX) ((DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0108	.1358	.0706	.6078	. 6001	.0718
6-FAS 02 TANKS	• OZ 22	• 1398	· • 11 85	0.	0.	0 .
MDA/STS/AM	.0003	• 0503	.0001	.:017	.6001	.0159
6-AM N2 TANKS	.0005	• 8296	. 0) 29	0.	0.	0.
COMMAND/ SERVICE MOD.	.0006	· 2275	.0019	.[116	.()01	.0078
DEPLOYMENT ASSEMBLY	.0102	. 5444	.0003	C •	0.	0 •
ATM-RACK, CMGS, 4-SAS	.0062	•5163	.0073	.6306	.0000	.0000
ATM-SPAR CENTER	.0000	. 6334	. 03 03	.021	.0001	0 •
ATH-GRAZCAN CENTER	.0000	.0006	. 00 76	.[32[.0002	.0013
		***	***			
SUM	.0519	• 6246	. 20 16	•€254	.1336	•0969

BR/OWS SKIRT/IU/FAS	. 266 9
6-FAS 02 TANKS	.2804
MDA/STS/AM	.1786
6-AM N2 TANKS	.0330
COMMAND/SERVICE MOD.	. 2495
DEPLOYMENT ASSEMBLY	.0549
ATM+RACK, CMGS, 4-SAS	. 1299
ATM-SPAR CENTER	.01.27
ATH-GRA/CAN CENTER	.0641

TABLE A-28 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 12A RUN NO. 574 FREQUENCY = 5.85

			5.40		646	2.42	
ガンジェ	GMC	GMC	GMC	<u>GMC</u>		GMC	
vn.	(0X)	(DY)	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0003	.0727	.0009	.0055	.0000	0606	PASE RNG/OWS SKIRT
			•				OWS/IU INTERFACE
?	.0001	.0000	.0120	.0001	.0002		
3	0000	.0047	.0440	.0012	0031		IU/FAS INTERFACE
4	.0054	.0207	.0364	0.	J.	0.	FAS 02 90TL1,+Y .+Z
5	.0011	.0435	.0179	3.	9.	0.	FAS 02 30TL2,+Y +Z
, <u>5</u>	.0005	.8445	.0104	0 •	0.	3.	FAS 02 BOTL3,-Y +Z
7	.0042	.0300	.0282	0 •	0 •	0.	FAS 02 BOTL4,-Y +Z
3	• 9 9 9 0	.0007	.0200	0 •	0.	0.	FAS 02 BOTL5,-Y -Z
3	1100.	• 0 0 0 3	.0056	9.	Ũ.	0.	FAS 02 BOTL6,-Y -Z
1.0	. 0 147	.0023	.0041	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0208	.0000	J •	· e •		FAS/A4/DA IF, +7
12	• 9 9 5 3	no46	.0097	0.	0.	0.	FAS/AM/DA IF, -Y
13.	.0002	.0001	0005	9 🕯	0.	0.	FAS/DA IF, -Y -Z
1 4	0001	.0905	.0000	J •	0.	0.	FAS/AM IF, -7
1=	.0003	0000	.0005	9 •	0.	ð.	FAS/JA IF, +Y -Z
15	3331	.0092	.0001	.0000	• 0 0 0 0	.0000	AM TUNNEL/SHEAR WB
17	.0000	.0224	.0000	. 9994	. 0000	.0043	AM TUNNELISTS IF
19	.0001	0008	.0000	.0005	.0000	.0086	MDA/STS INTERFACE
. 19	.0001	•9296	0000	.0007	0000	.0030	MOA CONE/CYL ITRFC
2.0	. 0004	.0027	.0016	9.	0.	0.	N2 TANK, +Y, LOWER
21.	.0000	.0038	.0013	0.	0.	û.	NZ TANK, +Y, UPPER
22	.0000	.0067	.0000	0.	0.	g .	NZ TANK, +Z, LOWER
22	.0000	.0112	.0000	3.	0.	0 •	N2 TANK, +Z, UPPER
24	.0000	.0019	.0000	3 •	0.	0 •	N2 TANK -Z, LOWER
?=	• 0 0 0 0	•0033	.0000	3.	0.	0 •	Nº TANK, -7, UPPER
25	.0701	.9897	.0000	.0007	0000	.0002	CM, FHO BULKHEAD
27	.0901	.0589	.0017	.0006	.0000	0004	CM, AFT BULKHEAD
28	• 0034	• 9267	.0001	.0040	0000	.0006	SM, FWD BULKHEAD
29	0000	0521	.0001	.0054	.0031		SM, AFT BULKHEAD
٦ ڙ	.0001	.0142	.0000	0.	0.		LOWER D LATCH, DA
31	. 1055	0002	.0000	0.	0.	9.	LOWER +Y TRUNNION
72	.0035	.0000	.0003	9.	C •	0.	LOWER -Y TRUNNION
, z z	.0001	.9304	.0000	9 •	0 •	0 •	EREP PACKAGE C.G.
74	.0001	.0019	.0008	0.	0.	0.	ATM PN 6,7 IF, OUTR
. 75	.3012	•0002	.0012	0 •	ð.	9 .	ATM PN 4,5 IF, OUTR
7 4	.0513	.0000	.0009	0.	9 •	0.	ATM PN 8,1 IF, OUTR
37	.0031	.0005	.0005	J •	0.	0 •	ATM PN 2,3 IF, OUTR
z 8	0001	•9388	.030A	g .	0.	0.	ATM PN 6,7 IF, INNR
्र ⊜	.0025	.0018	.0005	J •	0 •	0.	ATM PN 4,5 IF, INNR
40	.0000	•0196	.0010	o •	0.	0.	ATM PN 8,1 IF, INNR
41	0000	.0009	• 0 005	0.	0.	0.	ATM PN 2,3 IF, INNR
4?	• 9 9 9 5	.0005	.0004	.0000	.0000	.0000	CMG, -Y SIDE
43	.0931	.0006	.0005	.0000	.0000	.0000	CMG, +Y SIDE
44	.0000	.0001	. 0000	.0000	.0000	.0000	CMG, +X SIDE
4 5	.0900	.0000	ū.	0.	0.	0 •	ATM SAS, PN 1
ur	. 20 11	.0001	0 •	3 • →	0.	0 •	ATM SAS, PN 3
7 4	.0000	• 30 00	0.	0.	0.	0 • '	ATM SAS, PN 5
4 B	.0101	.0001	0.	0.	0.	0.	ATM SAS, PN 7
4 9	•0000	.0004	.0000	.0021	.0001		SPAR CENTER
Fŋ	1000	• 00 06	.0000	0020	.0002	,	GRAZCAN CENTER
SUM	. 1519	.5246	.2016	.0254	.0006	. 096	

TABLE A-29 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 13A	TEST FREQUENCY = 6.25 HZ.					
COMPONENT	GM C	GM C	GM C	GMC	GM C	GM .C
NAME	(nx)	(OY)	(DZ)	(TX)	(TY)	(TZ)
BR/OHS SKIRT/IU/FAS	.0125	. 20 39	.1834	.0363	•1252	.0007
5-FAS 02 TANKS	. 0445	.3141	.1350	0 • .	Ú.	0 • ,
MDA/STS/AM	.0005	.0036	10.85	.[]21	.0224	.0009
5-AH N2 TANKS	.0006	.0017	. 355C	C.	7.	0.
COMMAND/SERVICE MOD.	.0016	.5087	.112[.(049	. 00 85	0082
DEPLOYMENT ASSEMBLY	.0024	.û154	. 0564	Ĉ.	0.	ŋ .
ATM-RACK, CMGS, 4-SAS	.0108	.0036	.0352	.0000	.0301	.0000
ATM-SPAR CENTER	.0097	. 23 3 0	. 9975	.0003	.2028	0.
ATM-GRA/CAN CENTER	.8009	.0000	• 39 40	.0102	.0340	.0002
SUM	. 6737	. 05 10	.6970	.0137	. 15 3 0	.0017

BR/OWS SKIRT/IU/FAS	.3319
6-FAS OZ TANKS	.1935
MDA/STS/AM	.1379
6-AM N2 TANKS	.0574
COMMAND/SERVICE MOD.	.1349
DEPLOYMENT ASSEMBLY	.0741
ATM-RACK, CMGS, 4-SAS	.0497
ATM-SPAR CENTER	.0113
ATM-GRA/CAN CENTER	. 3093

TABLE A=30 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 13A RUN NO. 491 FREQUENCY = 6.25

	17.51	~(E.	174	XON NO.	471	THE GOET	967 - 9129
400F	640 (74)	GMC ""(ny)"	GMC (DZ)		GMC (TY)	w	F= 5-200 C C C C C C C C C C C C C C C C C C
▼ . •			(0)	(1 // /	,		5255X11 115X
1	.0000	.0003	.1487	.0025	.0713	.0005	BASE RNG/DWS SKIRT
.2	0701	.0002	.0010	.0014	.0174	0001	OWS/IU INTERFACE
3	.0993	. Dr JF	.0022	· 0024	.0355	.0003	IU/FAS INTERFACE
4	.0978	.0023	.0257	0 •	Ũ•	J.	FAS 02 BOTL1,+Y +Z
5	.0194	.0046	.0300	0 •	0 •	0.	FAS 02 BOTL2,+Y +Z
F.	.0080	.0033	0255	0 •	0.	0.	FAS 02 30TL3,-Y +Z
7	.0025	.0322	.0192	0.	0.	0.	FAS 02 BOTL4,-Y +Z
٩	• 0023	.0004	.0162	0.	0 •	0.	FAS 02 30TL5,-Y -Z
3	.0083	.0012	.0183	0.	0 •	0.	FAS 02 BOTLE,-Y -Z
10	0000	• 0000	.0045	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0031	.0001	.0133	0.	0.		FAS/AM/DA IF, +Z
12	• 9995	•0105	.0061	0.	0.	0 •	FAS/AM/DA IF, -Y
1.3	.0002	.0002	.0020	0.	0.	0.	FAS/DA IF, -Y -Z
1 4	• 0033	.0018	.C055	0.	0 •	0.	FAS/AM IF, -7
1 -	.0003	• 0001	.0005	0.	0.	0.	FAS/04 IF, +Y -Z
15	.0000	.0005	.0254	.0001	•0001	.0002	AM TUNNEL/SHEAR WB
17	.0000	.0021	.0503	.0614	.0064		AM TUNNEL/STS IF
18	.0002	.0000	.0171		.0066		MDA/STS INTERFACE
19	.0002	.0010	.0157	. 3334	•0093		MOA CONE/CYL ITREC
23	.0000	.0001	.0071	3 •	0.	0.	NZ TANK, +Y, LOWER
21	. 1001	.0n02	.0097	3.	0.	0.	NZ TANK, +Y, UPPER
22	.0002	.0001	.0099 .0122	0. 0.	0.	0.	N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER
23 24	.0031	.0000 .0007	.0061		0.	0.	NZ TANK -Z, LOWER
25	.0002 .0001	•0006	.0101	ป. ข.	0.	0.	NZ TANK, -Z, UPPER
5 e	.3001	.0027		•0007			CM, FWD BULKHEAD
27	.0001	.0027	.0000		-0000		CM, AFT BULKHEAD
28	.0301	.0035	.0294	. 3305			SM, FWD BULKHEAD
Şq	.0007	.0010	.0825	.0035	.0053		SM, AFT BULKHEAD
3.0	.0313	.0014	.0014	3.	0.	0.	LOWER D LATCH, DA
31	0000	0014	.0195	9.	0.	0.	LOWER +Y TRUNNION
32	.0912	.0123	.6112	0.	0.	0.	LOWER -Y TRUNNION
33	0001	.0702	.0243	0	0.	0.	EREP PACKAGE C.G.
34	. 0 2 3 5	.0703	0000	ð.	0.	0.	ATM PN 5,7 IF, OUTP
35	.0001	0001	.0021	0.	0.	0.	ATM PN 4,5 IF, OUTR
3.6	.0020	.0001	.0025	0.	0. :	0.	ATM PN 8,1 TF, OUTR
37	.0008	.0000	.0125	3 •	G •	9.	ATM PV 2,3 IF, OUTR
7 9	.0004	.0014	0001	3 •	0.	0 •	ATM PN 5,7 IF, INNR
ζĠ	.0037	.0010	.0012	9.	g .	o .	ATM PN 4,5 IF, INNR
40	.0011	.0006	.0013	0.	o.	0.	ATM PV 8,1 IF, INNR
41	.0512	0001	.0103	3 •	0.	0.	ATM PN 2,3 IF, INNR
42	.0005	.0001	.0014	. 2000	.0000	.0000	CMG, -Y SIDE
43	.0001	.0001	.0002	.0000	.0000	.0000	CMG, +Y SIDE
£4 £4	.0001	0000	.0031	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 1
45	.0071	.0001	0.	0 •	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0.	0 •	0 •	ATM SAS, PN 5
49	·• 0 0 0 0	•0000	0.	θ.	0 •	g •	ATM SAS, PN 7
49	.0007	.0000	.0075	.0003	8500.		SPAR GENTER
εû	. ၅ ၅ ၅ ૧	• 0000	.0040	.0002	.0040		GRAZCAN CENTER

.0137

.1530

.9510

TABLE A-31 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 138		TEST FREQUENCY = 5.36 HZ.				
C OMPONE NT	G# C	GM C	GMC	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/ONS SKIRT/IU/FAS	.0697	.033	. 15 40	.:168	.0974	.0011
6-FAS 02 TANKS	.0336	.0165	.1294	e •	0.	0 •
MDA/STS/AM	• CC C 4	.0021	.0880	.0315	.0203	.0004
6-AM N2 TANKS	.0004	. 6014	.9413	n.	ũ .	3.
COMMAND/SERVICE MOD.	.0008	.0025	.2771	.0011	.0071	0001
DEPLOYMENT ASSEMBLY	. CC 17	.0135	. 34 45	0,	ü •	0.
ATM-RACK, CMGS, 4-SAS	.0081	.0321	• 1276	.0000	.6398	.0000
ATH-SPAR CENTER	.0006	. 53 56	.0352	0001	.0924	0.
ATH-GRAZCAN CENTER	.0036	.0000	. 30 35	.0001	.6034	.0302
SUM	.0560	.0415	.7615	.0396	.1307	.007

BR/OWS SKIRT/IU/FAS	.2713
6-FAS 02 TANKS	.1734
MDA/STS/AM	.1127
6-AM N2 TANKS	.0431
COMMAND/SERVICE MOD.	.2886
DEPLOYMENT ASSEMBLY	.0597
ATM-RACK, CMGS, 4-SAS	. 1379
ATM-SPAR CENTER	.9684
ATH-GRA/CAN CENTER	.0078

				•			-
אטחב	GMC	SMC	GMC.	GMC_	୍ଟ୍ୟପ୍	GM.C	NODE
~ NO.	(ñx)	(DY)	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
•		•					_
1	.3000	0000	.1247	.0017	.0558	-0001	BASE RNG/JWS SKIRT
?	0001	.0002			.0142		OWS/IU INTERFACE
7		.0002		.0035			IU/FAS INTERFACE
	.0003		0001				
4	.• 0 755	• nr 39	.0117	9•	0.		FAS 02 BOTL1,+Y +Z
<u>r</u>	• 1085.	• 0082	.0180	J •	0.	0 •	FAS 02 BOTL2,+Y +Z
6	.0057	• 0004	.0265	J •	J •	0 •	FAS 02 BOTL3,-Y +Z
7	.0024	.0006	.0265	3.	ð.	3 •	FAS 02 BOTL4,-Y +Z
Ω	. 3743	.0010	.6182	J•	Û•	0.	FAS 02 30TLF,-Y -Z
G	.0071	.0023	.0194	0.	0.	0.	FAS 02 30TLA,-Y -Z
<u>1</u> ()	0000	.0000	.0022	0.	3 •	0 •	FAS/AM/DA IF, +Y
11	.0070	.0002	.0111 .		0.	0.	FAS/AM/DA IF, +Z
12	.0102	.0003	.0074	3.	0.	3.	FAS/AM/DA IFY
		.0005	.0072		0.	0.	•
13	.0001			0.			FAS/DA IF, -Y -Z
1.4	.0020	.0017	.0040	9• ,	0.	0.	FAS/AM TF, -Z
. 15	.3002	.0001	.0002	0.	9.		FAS/DA JF, +Y -Z
15	•000	. 0004					AM TUNNEL/SHEAR WB
17	• 2000	.0014	.0411	.0011			AM TUNNEL/STS IF
19	.0702	.0002	.0102	.0001	.3070	.0001	MDA/STS INTERFACE
13	•0002	.0002	.0150	.0053	.0077	.0001	MDA CONE/CYL ITREC
20	. 0000	.0000	.0051	0.	0 •	0.	NZ TANK, +Y, LOWER
21	.0001	. 2001	.0066	0.	G •	0.	N2 TANK, +Y, UPPER
22	.0301	.0000	.0074	0.	0.		NZ TANK, +Z, LOWER
23	.3000	• 99 0 0	.0074	9.	0.	3.	NZ TANK, +Z, UPPER
						0.	
24	.0701	.0007	.0048	9.	0.		NZ TANK -7, LOWER
2=	.0001	.0006	.0077		0.	J.	NZ TANK, -Z, UPPER
25	.0001	• 0007		.0004			CM, FAD BULKHEAD
27	• 6 9 9 9	.0013				0000	
28	. 7 700	.0002	.0312		.0025	.0000	SM, FWD BJLKHEAD
29	•0008	.0003	.0564	•000A	• 0049	0001	SM, AFT BULKHEAD
33	•))) 9	.0015	.0013	0.	0 •	0 •	LOWER D LATCH, DA
31	0000	.0917	.0127	3.	0.	0.	LOWER +Y TRUNNION
32	.0010	.0102	.0088	3 .	0.	0.	LOWER -Y TRUNNION
33	0002	.0001		· D •	0.	o.	EREP PACKAGE D.G.
		.0001	0000	3.	0.	0.	ATM PN 5,7 IF, OUTR
7.5	00002	0000	.0015	9.	0.	j.	ATM PN 4,5 IF, OUTR
			.0020	0.		0.	ATM PN 8,1 TF, OUTR
75 	.0914	.0001			0.		
77	.0007	0900	.0098	0.	9.	0.	ATM PN 2,3 IF; OUTR
3.8	.0004	.0008	0000	3.	0.	0.	ATM PN 5,7 IF, INNR
39	• 0025	.0005	.0009	0 •		0.	ATM PN 4,5 IF, INNP
40	.0309	.0004	.0017	0 •	0.	0 •	ATM PN 8,1 IF, INNR
41	.0009	0001	.0081	0.	0.	0.	ATM PN 2,3 IF, INNR
42	•0003	•.0000	.0011	.0000	.0000	.0000	CMG, -Y SIDE
4 %	.3031	.0001					CMG, +Y SIDE
44	2031	0000	.0024		.0000		CMG, +X SIDE .
45	.0000	.0000	0.	Ú•	0.	3.	ATM SAS, PN 1
415	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 3
47	.0001	.0000	0.	3.		0.	ATM SAS, PN 5
49	.0000	•0000	0.	0.004 1	0.	0.006	ATM SAS, PN 7
49	. 0005						SPAR CENTER
= J	.0005	.0000	.0035		. 3034		GRAZCAN CENTER
							•
SAW	.9560	.0415	.7615	0096	•1307	.0013	5

TABLE A-33 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 14A		TEST FREQUENCY = 6.73 HZ.					
COMPONENT	GH C	GM C	GM C	GMC	GM C	GMC	
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)	
BRIONS SKIRT/IU/FAS	.0016	.0557	.1169	.:398	.0020	.0255	
S-FAS 02 TANKS	.0125	. 25 77	.2102	g.	G •	3.	
MDA/STS/AM	.0031	• 0 3 3 6 ·	.0058	.0002	.0006	.0299	
5-AM N2 TANKS	.0026	. 6231	• 99 95	· G •	G.	0.	
COMMAND/SERVICE MOD.	.0019	. 35 34	. 31,44	6307	.0387	.038	
DEPLOYMENT ASSEMBLY	.0081	.6502	.0043	0.	3.	0 •	
ATM-RACK,CMGS,4-SAS	.0073	.0146	.0056	.0300	0000	.0000	
ATM-SPAR CENTER	.0000	.3002	ំ.១១១០	.0026	.0001	0.	
ATM-GRAZCAN CENTER	• 60 0 0	.0304	.0100		. 7901	.0019	
			·			***	
SUM .	. 0341	. 4890	• 36 56	: .8457	.035	.0511	

BR/OWS SKIRT/IU/FAS	.2416
6-FAS OZ TANKS	•48 9 3
MDA/STS/AM	.0712
6-AM N2 TANKS	. 3352
COMMAND/SERVICE MOD.	.0749
DEPLOYMENT ASSEMBLY	.1625
ATM-RACK, CMGS, 4-SAS	.0276
ATM-SPAR CENTER	.0030
ATM-GRA/CAN CENTER	.0148

A-37 TABLE A-34 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE

SUM

.0341

.4890

.3655

.0457

.0612

.0035

RUN NO. 474 FREQUENCY = 14 4 5.73 GMC GMC. NJUE SMC GMC GMC GMC NODE MO. (nx) (DY) (D7) (TX) (TY) (TZ) DESCRIPTION .0142 .0029 .0014 .0008 .0084 BASE RNG/OWS SKIRT .0000 1 .0107 -.0001 .0203 -.0006 -.0001 OWS/IU INTERFACE 2 -.0000 .0278 .0002 .0019 3 -.3000 .0703 .0172 IU/FAS INTERFACE .0765 0. 0. F45 02 90TL 1.+Y +Z -.0002 .0301 0. Ξ .0329 .0136 .0494 J. 0. 0. **FAS 02** 30TL2,+Y +Z 5 .0522 FAS 02 301L3.-Y +Z .0019 .0115 0. Q. a. 0. 0. FAS 02 .0744 .0101 .0552 G. 30TL4,-Y +Z . 9727 .0073 0. 9. 3. FAS 02 30715,-Y -Z .0314 ú FAS 02 30TL6,-Y -Z .1089 .0002 0. .0021 0. 0. .0941 10 .0005 .0029 0. 0. 3 . FAS/AM/DA IF, +Y .0118 .0013 0. FAS/AY/DA IF. +Z .0001 0. 0. 11 .0038 .0152 0. FAS/AM/DA IF. -Y 1? .0005 0. 0. FAS/04 IF. -Y -Z 13 .0029 -. 1110 .0118 0. 0. 0. 0. .0074 .0019 FAS/AM IF, -7 14 .0002 0. 0. 15 .0027 . 1903 .0001 0. 0. 0 . FAS/DA IF, +Y -Z 15 .0029 .0000 -.0000 -.0000 AM TUNNEL/SHEAR WB . 11111 .0113 17 .0013 .0000 .0151 AM TUNNEL/STS IF -. 2000 .0170 .0003 .0923 .0000 -.0000 .0014 -.0001 .0133 MDA/STS INTERFACE 13 .0004 19 .0000 .0030 .0002 .0901 .0015 MOA CONE/CYL ITREC 20 .0005 .0046 .0028 3. N2 TANK, +Y, LOWER J . 0. .1001 0. 21 .0944 .0019 3. U. N2 TANK. +Y. UPPER .0000 .0001 -.0014 N2 TANK, +Z, LOWER 22 3. 0. 0. 23 .0000 .0012 N2 TANK, +7, UPPER .0019 0. 0. O. -Z, LOHER 24 .0011 N2 TANK .0000 .0973 0. 0. 0. N2 TANK, -Z, UPPER 25 . 0000 .0066 .0011 0. 0. o. 25 -.0000 .01.77 .0031 -. 3000 -.0000 .0000 CM, FWD BULKHEAD -.0001 27 .0075 -.0000 CM. AFT BULKHEAD .0001 .0165 .0020 .0003 SM. FWD BULKHEAD 28 .0019 .0058 .0010 .0002 -.0003 .0005 .0005 .0020 SM, AFT BULKHEAD .0027 29 -.0000 .0134 30 .0000 .9390 .0000 0. 0. LOWER D LATCH. DA 0. 31 .0035 .0061 .0037 0. 0 . LOWER +Y TRUNNION 0. LOWER -Y TRUNNION -.0003 0. 32 .0020 .0005 0. 0. 33 .0000 0. EREP PACKAGE C.G. .0070 .0010 0. 0. .0012 0. 74 .0917 .0002 0. 0. ATM PN 5.7 IF. OUTR 35 . 1112 .0001 .0012 ATM PN 4.5 IF.OUTR 0. 0. 0. 0. 35 .0013 .0000 .0012 0. 0. ATM PN 8.1 TE, OUTR マフ .0902 .0009 .0000 0. ΔTM PN 2,3 TF, OUTR 0. 0, 38 .0002 .0007 .0086 ATM PV 5,7 IF, INNR 0. Э. 0. 70 .0207 .0011 .0005 J. ŋ. 0 . ATM PN 4.5 IF, INNR ATM PN 8,1 43 .0010 .0001 .0014 ŋ. 0. IF, INNR 0. -.0000 .0007 .0000 ATM PN 2.3 IF. INNR 41 G a 0. .0002 .0000 42 .0004 . C003 .0000 OMG, -Y SIDE .0000 4 7 -.0000 .0000 .0004 .0005 .0005 .0000 CMG. +Y SIDE .0000 .0000 44 .9399 .0001 .0000 .3000 CMG. +X SIDE 45 ŋ. 0. ATM SAS, PN 1 .0001 .0001 0. 0. 45 Ò. ATY SAS, PM .0001 .0001 0. Q. 0. ATM SAS, PN 47 0. 0. .0001 .0001 Ð . 0. 14 B .0000 ..0000 ATM SAS. PN ٥. 0. 0. 0. 49 .0000 .0902 .0000 .0026 .0001 .0000 SPAR SENTER : F 0 • 0000 .9004 .0000 .0024 .0001 .0019 GRAZCAN CENTER

TABLE A-35 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

1	TEST	r FREOUE	NCY =	7.59 HZ.	
GM C	GM C	GM C	GMC	GM C	GMC (TZ)
			• • • • • • • • • • • • • • • • • • • •		.0339
.0120	. 0935	• 1186	C •	9.	0.
.0001	.0188	. 13 05	0	C • '	0.
.0015	.0171	.0351	e •	C .	0.
.0003	.0013	0000	.:566	.0012	0.0061
.0315	. 44 99	.3304			.6147
	GMC (DX) • 60 21 • 01 20 • 00 90 • 00 01 • 00 05 • 01 47 • 90 03 • 90 01	GMC GMC (DY) .0021 .3377 .0120 .0935 .0000 .0500 .0001 .0188 .0006 .0291 .0015 .0171 .0147 .2018 .0003 .0013 .0001 .0006	GMC GMC GMC (DX) (DZ) .0021 .3377 .0165 .0120 .0935 .1186 .0000 .0500 .0002 .0001 .0188 .0105 .0006 .0291 .0101 .0015 .0171 .0051 .0147 .2018 .1794 .0003 .00130000	GMC GMC GMC GMC GMC (0X) (DY) (DZ) (TX) .0021 .3377 .0155 .(143 .0120 .0935 .1186 00000 .0500 .0002 .CJ08 .0001 .0188 .0305 00006 .0291 .0101 .(146 .0015 .0171 .0051 00147 .2018 .1794 .0013 .0003 .00130000 .1666 .0001 .0006 .0000 .0666	GMC GMC GMC GMC GMC GMC (UX) (UY) (UZ) (TX) (TY) .0021 .3377 .0165 .(143 .0002 .0120 .0935 .1186 U. 90000 .0500 .0002 .CJ08 .0000 .0001 .0188 .0305 U. 00006 .0291 .0101 .(306 .0304 .0015 .0171 .0051 U. 00147 .2018 .1794 .C013 .CJ00 .0003 .3013000C .C876 .0004

BRIONS SKIPT/IU/FAS	.0747
6-FAS 02 TANKS	.2242
MDA/STS/AM	.0540
6-AM N2 TANKS	.0194
COMMAND/SERVICE MOD.	.0426
DEPLOYMENT ASSEMBLY	.0236
ATM-RACK, CMGS, 4-SAS	. 397 3
ATM-SPAR CENTER	.0695
ATM-GRAZCAN CENTER	. 9948

TABLE A-36 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

RUN NO. 600

FREQUENCY =

7.53

TEST MODE

3 14

.0315

.4499

.3304

.1712

.0023

.0150

15 A

4115 SMC GMC GMC .. GMC SMC GMC NODE (DZ) (DY) (TX) (TY) (TZ) DESCRIPTION VO. (DX) . 2001 .0202 .0031 .0022 .00J1 .0010 BASE RNG/OWS SKIPT 1 7 .0039 .0010 OWS/IU INTERFACE -.0000 .0004 .0024 -.3030 .0019 IU/FAS INTERFACE 3 .0002 .0002 .0059 .0082 . 1200 0. 4 0. FAS 02 -.0003 .5051 .0314 0. 30TL1.+Y +Z . 0045 .0012 .0233 FAS 02 BOTL2,+Y +Z 1. 9. 0. . 3025 5 0. FAS 02 .0144 .0119 9.0. 90TL3,-Y +Z .0013 .0009 **FAS 02** 301L4,-Y +Z .0412 9 · 0. 0. .. 1462 Э. 0. FAS 02 .0011 .0068 907L5,-Y -Z 0. 3 .0027 .0257 .0041 0. FAS 02 30715 .- Y - Z 0. 0. .0003 17 • On 39 .0000 0. Э. FAS/AM/DA IF, +Y. 0. 11 .0004 .0031 .0000 0. 0. 3. FAS/AM/DA IF, +Z 12 .0013 .0187 .0037 0. 0. FAS/AM/DA TF. -Y o . -Y -Z 13 . 1000 .0005 .0002 0. O. FAS/DA IF. 0. 14 ŋ. .0096 .00G2 0. 0. FAS/AM IF, - 7 .0000 15 .0000 -.0000 EAS/DA IF, +Y -Z .0001 0. 0 . J. 15 .0000 .0005 AM TUNNEL/SHEAR WB .0000 .3000 .0000 .0165 17 .0000 .0227 .0001 .0001 .0000 .0016 AM TUNNELISTS IF -.0000 MDA/STS INTERFACE 18 .0000 .0107 .0006 .0000 -.0004 .0061 .0013 13 -. 0000 .0001 .0030 .0000 MDA CONE/CYL ITREC 29 -.0000 .0559 .0001 0. N2 TANK, +Y, LOWER 0. 0. .0001 0. N2 TANK, +Y, JPPER 21 .0054 .0000 0. 0. 22 .0000 .0001 .0000 0. G. 0. N2 TANK, +Z, LOWER 27 .0000 .0009 . CO01 N2 TANK. +7. UPPER 0. 0. J . NZ TANK -Z, LOWER 24 .0033 .0002 .0000 0. 9. 0. .0000 .0001 25 .0033 n. 0. NO TANK, -Z, UPPER 0. 25 .9087 CM. FWD BULKHEAD .0000 -.0000 -.0000 .0015 -.0000 クマ .0000 .0090 . 8347 -.0000 -.0000 -.0000 CM. AFT BULKHEAD 23 .0000 .0000 SM, FWD BULKHEAD -.0000 .0017 .0005 .0000 .0005 .0006 .0004 .0017 23 . 00 98 .0033 SM, AFT BULKHEAD מ צ .0. .0001 .0037 .0004 0. LOWER D LATCH. DA 0. .0004 0. 0. LOWER +Y TRUNNION 34 .0008 .0327 0. LOWER -Y TRUNNION 3? .000? -.0003 .0012 0. J . 9 . ø. EREP PACKAGE C.G. 33 .0905 .0133 .0007 ·) . O. 34 .0005 . 0044 0. ATH PN 5.7 IF. OUTR .0001 0. υ. **7** [-.0003 .0024 2. 0. ATM PN 4,5 IF, OUTR .0415 0. 76 .0011 .0039 . C510 ũ. a. 0. ATM PN 8.1 TF.OUTR 77 .0012 .0089 .0022 J. O. 3. ATM PV 2,3 IF, OUTR 38 .0729 .0862 .0044 0. ATM PN 5,7 IF, INNR 0. 0. 7 Q . 9716 .0205 .0159 ATM PN 4,5 TF, "NNR 0. 0. 0. .0095 .0300 0. 9. ATM PN 3.1 TF, INNR 40 -.0104 Э. 41 -.0003 .0439 .0021 0. 0. ATM PN 2.3 IF. INNR .0125 .0004 .0000 CMG, -Y SIDE 42 .0002 .0065 .0000 CMG, +Y SIDE .0000 63 .0004 .0066 .0153 .0005 -.0030 .0003 .0000 .0002 44 .0000 .0056 .0000 CMG, +X STOE . 1928 ATM SAS. PN 1 45 .0028 0. 9. 0 . 0. 45 ATM SAS, PN 3 ..0013 .0013 9. 0. 0. 0. 4-ATM SAS, ÞΝ .0925 .0025 0. 5 0. 0. 0. ATM SAS, PN 7 48 .0005 .070= 0. .0003 TPAR CENTER -. 0000 . 9665 49 .0003 .0013 .0012 .0000 57 . 1791 .0006 .0876 .0004 .0061 GRAZCAN CENTER ----

TABLE A-37 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 16	TEST FREQUENCY = 8.85 HZ.					
COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OHS SKIRT/IU/FAS	.1350	. 00 37	00 84	.006	.0013	.0002
5-FAS 02 TANKS	. 1465	.0056	.0210	C •	0 •	0 •
MDA/STS/AM	.0021	.0009	.0316	.0381	.0002	.0001
6-AM N2 TANKS	.0040	.0004	. 9013	C •	0.	0.
COMMAND/SERVICE MOD.	.5776	.6312	.0012	.0023	0001	.0610
DEPLOYMENT ASSEMBLY	.G111	.0014	. 1175	0.	C •	0.
ATM-RACK, CMGS, 4-SAS	.0016	.0006	.0015	.0000	. 60 0 0	.0000
ATM-SPAR CENTER	. 0000	. 00 00	.0006	.6331	.0007	9.
ATM-GRAZCAN CENTER	.8700	0000	.0001	.0001	. 5097	0000
SUM	.8781	.0139	.0427	.0012	.029	.0613

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	.1492
6-FAS 02 TANKS	•1732
MDA/STS/AM	.0149
6-AM N2 TARKS	.0057
COMMAND/SERVICE MOD.	.6413
DEPLOYMENT ASSEMBLY	.0298
ATM-RACK, CMGS, 4-SAS	•0738
ATM-SPAR CENTER	.0009
ATM-GRA/CAN CENTER	.0009

ORIGINAL PAGETS
OF POOR QUALTRY

TABLE A-38 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	· TEST	AUUE	16 A	?UN NO.	347	FREQUEN	CY = 8.85
, ОИ ОИ		GMC (ny)	64C (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	
1	. 0758	.9394	.0042	.0000	.0005	.0001	BASE RNG/DWS SKIRT
2	.0215	.0004			.0005		OWS/IU INTERFACE
3	.0234	.0010	.0021		.0002		IU/FAS INTERFACE
. 4	0177	.0003	0000	C •		. 0 •	FAS 02 BOTL1,+Y +Z
5	0282	.0011	.0011	0.	9.	. J •	FAS 02 BOTL2,+Y +Z
, Ķ	.0202	.0009	0000	0.	0.	J•	FAS 02 301L3,-Y +Z
? ?	.0254	.0007	.0031	0.	0.	0.	FAS 02 BOTL4,-Y +Z
q	. ŋ マ ƙ G	.0020	.0128	0.	0.	0.	FAS 02 90TL5,-Y -Z
a a	.0174	.00.05	.0939	9.	0.	0.	FAS 02 907 L6, -Y -Z
	.0027	.9009	0000) •	0.	3.	FAS/AM/DA IF, +Y
10	.0027 .0043	.0001	.0003	3 .	0.	0.	FAS/AM/DA IF, +Z
	.0744	.0008	• 00 00	3.	3.	9.	FAS/AM/DA IF, -Y
12			.0005	3.			FAS/DA IF, -Y -Z
1.3	.ეეე4 	.0032			0.	0.	
14	.0018	.0005 .0001	.0000 .0000	3.	0.	0.	FAS/DA IF, -Z FAS/DA IF, +Y -Z
15	.0007	.0001	.0005	0. •)))))	0.		AM TUNNEL/SHEAR WB
15	.0007	.0000	.0009		.0000	.0000	
17	.0000	.0003	.0003	.0000 .0000	.0001		MDA/STS INTERFACE
13	.0005		• 0000	• 30 30	.0000	.0000	
19	.0008	. 1105		• JU JU	.0001	• • • • • • •	N2 TANK, +Y, LOWER
20	.0008 .0005	.0000 .0000	.0000 .0000	3.	0.	0.	N2 TANK, +Y, UPPER
21	.0005	• 90 0 0	.0007	j.	0.	0.	N2 TANK, +Z, LOWER
22 27	.0011	.0000	• 00 05 ,		0.	3.	N2 TANK, +Z, UPPER
? · 24	.0005	.0903	• 00 00	0.	0.	0.	N2 TANK -7, LOWER
5E	. 0005	.0903	.0000				N2 TANK, -Z, UPPER
25 25	• 7705 • 9538	.0001	.0010	0. .0001	0. .ეეე4	0 n n 2	CM, FND BULKHEAD
27	.0521	0000	.0000	.0000			CM, AFT BULKHEAD
28	• 2325	.0004	.0000	.0000	0004		SM, FWD BULKHEAD
5.3	• 2292	.0004	.0002	.0000	.0002		SM, AFT BULKHEAD
3.0	9.45	.0002	0001	9.	0.	9.	LOWER D LAYOH, DA
31	0037	.0002	0001	0.	0.	9.	LOWER +Y TRUNNION
32	.0033	.0005	.0001	9.	_	0.	LOWER -Y TRUNNION
		.0001	.0075	0.	0.	0.	EPEP PACKAGE C.G.
34	.0000	0000	.0005	0.	0.	0.	ATM PV 6,7 IF, OUTR
, 3E	0000	.0000	.0002	3 •	0.	0.	ATM PN 4,5 TF, OUTR
36	0000	0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
7.7	.0000	.0000	.0001	0.	0.	0.	ATM PN 2,3 IF, OUTP
38	.0001	.0000	.0004	3.	0.	0.	ATM PN 5,7 IF, INNR
	.0002	0000	.0001	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0004	.0000	.0000	3.	0.	9.	ATM PN 9,1 IF, INNR
41	.0002	0000	.0001	0 •	3.	0.	ATM PN 2,3 IF, INNR
4.2		0000	.0000	• 0000	.0000		CMG, -Y SIDE
43		.0700	.0000	.0000	.0000		
44	.0000	0000	.0000	0000	.0000		CMG, +X SIDE
45	.0001	.0301	0.	0.	0.	0.	ATM SAS, PN 1
45		.0000	0.	0.	0.	0.	ATM SAS, PN 3
47		.0904	0.	0.	0.	0.	ATM SAS, PN 5
4.9	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
49							SPAR CENTER
- ŋ		.0000	.0001				GRAZCAN CENTER
						***	•
SUM	.9791	.0139	.0427	.0012	.0029	.0513	3

TABLE A-39 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 17	TEST FREQUENCY = 11.59 HZ.					
COMPONENT	GMC	GMC	G₩ C	GM C	GM C	GM C
NAME	(DX)	(OY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	0003	.0318	.0130	.(112	.0944	.0044
6-FAS 02 TANKS	.0012	. 2412	.3261	0.	3 •	0 •
MDA/STS/AM	.0001	. 1013	.0084	•ũ169	.0001	0003
6-AM N2 TANKS	.0816	. 1932	.0259	0.	C.	0.
COMMAND/SERVICE MOD.	.0091	•9191	. 30 44	.6302	. (064	.3013
DEPLOYMENT ASSEMBLY	0011	.0943	.0041	C.	· 0 •	0.
ATM-RACK, CMGS, 4-SAS	.0015	.0017	.0015	. C J O C	.0000	.0050
ATM-SPAR CENTER	.0002	.0002	.0002	.0305	.0001	0.
ATM-GRAZCAN CENTER		.0000	.0051	• C-3 0, 7	.0001	.0000
SUM	.0033	• 58 3r	.3838	.0195	.0050	.0055

BR/ONS SKÍRT/IU/FAS	.0544
6-FAS 02 TANKS	.56 35
MDA/STS/AM	.1265
6-AM N2 TANKS	.1238
COMMAND/SERVICE MOD.	.0256
DEPLOYMENT ASSEMBLY	.0973
ATM-RACK, CMGS, 4-SAS	.9047
ATM-SPAR CENTER	.0012
ATH-GRAZCAN CENTER	.0010

SUM

A-43
TABLE A-40 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

.5830

.0033

.3838

.0195

.0056

·0050

	TEST	MODE	174	PUN NO.	549	FREQUEN	CY = 11.53
		640	640		CMC	640	W005
4205 40.	GMC (OX)	OMO (PO)	(DZ)	GMC.	GMC (TY)		NODE
		, , , ,		*		, , , , ,	
1	.0001.	.0012	.0003				BASE RNG/DWS SKIRT
2	• 0 0 0 0	.0058	. 9061		.0005		OWS/IU INTERFACE
13	• 0000	.0117	.0000	• 00 06	.0016		IU/FAS INTEPFACE
4	.0002	.0397	0575	0•	0.		FAS 02 80TL1,+Y +Z
٦ بد	.0001	.0005		0.	0.		FAS 02 BOTL2,+Y +Z
7	• 0 3 0 3	•0₹37 •1£06	• 15 08 0 = 84	0.	0 •		FAS 02 BOTL3,-Y +Z
9	9930 0091	.0904	.0581 .0077	0.	0.		FAS 02 BOTL4,-Y +Z FAS 02 30TL5,-Y -Z
o o	• 1002	• 09 0 4	.0004	0•	0.		FAS 02 30[L5,-Y -Z
10	0007	.0004	0001	0.	0.		FAS/AM/DA IF, +Y
11	.9991	0052	.0001		3.		FAS/AM/DA IF, +Z
12	0003	.0016	.0117	0.	3.		FAS/AM/DA IF, -Y
1 3	0000	.0010	00 05	0.	0.		FAS/DA IF, -Y -Z
14	.0'001	.0721	.0002	0.	0.		FAS/A4 IF, -Z
4 E,	.0793	.0106	.0013	j.	Ö•		FAS/DA IF, +Y -Z
15	• 9 7 6 9	.0249		.3014			AM TUNNEL/SHEAR WB
17	• 0 0 0 0	.0234		• 0040			AM TUNNELISTS IF
18	.0000	.0350	.0026	.0071	.0001	0010	MDA/STS INTERFACE
1 9.	. • วาอง	.0181	• 0031	. 9044	.0000		MDA CONE/CYL ITRFC
23	.3791	.0521	.0018	ù•	0 •		N2 TANK, +Y, LOWER
21	.0039	•0253	• 6014	0 •			NZ TANK, +Y, UPPER
22	• 9 9 6 9	.0014	.0143	0.	0 •		NZ TANK, +7, LOWER
-23	. 1117	.0028	.0034	0 •	0.		N2 TANK, +Z, UPPER
24	.0501	.0009	.0035	0.	U +		M2 TANK -Z, LOWER
?5 26	.0002	.0007	.0013	0.	0.004	0.007	NO TANK, -Z, UPPER
26 27	.0000 .0000	.0000 0097	.0001 .0036	0002 0000	•3635 •000r	.0093	CM, FWD BULKHEAD
29	• 0 0 0 0 1	.0007	.0000	.0000			SM, FWD BULKHEAD
2 9	1001	.0087	.0007	.0000			SM, AFT BULKHEAD
30	.0005	0073	.0002	0.			LOWER D LATCH, DA
34	0132	.0524	.0038	0.	J.		LOWER +Y TRUNKTON
32	. 5 5 6 8	.0328	00:10	0.	0.		LOWER -Y TRUNNION
33	• 3 209	.0065	.0011	0.	0 •	0 •	EREP PACKAGE C.G.
34	• 0 0 0 0	.0001	.0001	0 •	0.	3 •	ATM PN 6,7 IF, OUTR
35	.0002	.0000	.0002	0 •	0.	0.	ATM PN 4,5 IF, OUTR
36	.0002	.0000	.0004	0 •	0.	J .	ATY PN 8,1 IF, OUTS
スア	.0001	.0002	.0001	3 •	0 •	0.	ATM PN 2,3 IF, OUTR
7.9	.0002	•0009	.0001	0.	0.	0 •	ATM PN 6,7 IF, INNR
33	•0000	.0001	.0000	3.	0.	0.	ATM PN 4,5 IF, INNR
4 <u>0</u>	.0004	3000	.0004	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0961	.0001	• 00 01	0.	0.	0.000	ATM PN 2,3 IF, INNR
42 43	.0000	.0000	• 0000	.0000	•0000 0000	.0000	CMG, -Y SIDE CMG, +Y SIDE
4.3 6.4	.3001 .3303	.0000 .0000	.0001 .0001	.0000 .0000	•0000 •0000	.0000	CMG, +Y SIDE
4 7	.0001	.0000	0.0001	3.	9.	0.	ATM SAS, PN 1
46	•0000	.0000	0.	0.	0 •	0.	ATM SAS, PN 3
40	. 0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
49	.0001	.0001	0.	9.	0.	0.	ATM SAS, PN 7
40	.0002	.0002	.0002	-0005	.0001		SPAR CENTER
Fg	.0000	.0000	.0001	.0007	.0001		GRAZCAN CENTER
							`

TABLE A-41 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 18A

TEST FREQUENCY = 12.65 HZ.

COMPONENT	GM C	GM C	GM C	GM C	GM C	GM C
NAME	(XQ)	(PY)	(DZ)	(TX)	(YY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0030	.0075	.0115	.1865	-6005	.0003
6-FAS 02 TANKS	. 0386	.3202	• 01 55	C •	û•	0 •
MDA/STS/AM	.6004	0368	.3315	.6722	.0003	·i010
5-AM N2 TANK'S	.0003	.0345	.0383	₽.	0.	0 .
COMMAND/SERVICE MOD.	. 88 9 0.	.3350	.0016	.0693	.1034	0000
DEPLOYMENT ASSEMBLY	.0035	. 1156	.0053	0.	9.	0
ATM-RACK, CMGS, 4-SAS	.0001	.0333	.0902	3060.	.6300	.0000
ATH-SPAR CENTER	.0000	. 8338	.0000	.6391	.0000	0.
ATM-GRAZCAN CENTER	.0003	.0331	.0000	.0301	.0001	.0000
•						
SUM	.0320	.9723	.0739	.8192	. 9913	.0013

.1063
.0663
.6744
.0731
.2673
.0114
•0006
.0002
.0003

TABLE A-42 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 18A RUN NO. 526 FREQUENCY = 12.65

ัทบังรั	GMC	<u>e</u> MC	GYC				
- CV	(0X)	(04)	(DZ)	(XX)	(TY)	(TZ	DESCRIPTION
• 1	.0000	.0002	.0001		.0003		
2	. ღიეე	.0002	.0002	. 3104	3039		
3	0000	.0002	.0035		.0002	.0000	
4 5	.0018	.0065	.0051	ĵ.	ŋ •	.0 •	FAS 02 BOTL1,+Y +Z
٠ ب	.0103	.0018	.0013	0.	0.	0 •	FAS 02 BOTL2,+Y +Z
	.0051	.0041	.0021	0.	0.	0.	FAS 02 80TL3,-Y +Z
, 7	.0051 .0055	.0925	.0021	J.	0.	0.	FAS 02 90TL4,-Y +Z
વ	• 0 0 1 7 • 0 0 1 7	•0023 •0030	•0003 •0045	0.	0.	0.	FAS 02 901L5,-Y -Z
10	0000	.0001	.0045	0. J.	0.	0 •	FAS 02 30TL5,-Y -Z
1.1	.0000	.0048	0000	G •	0.	0. J.	FAS/AM/DA IF, +Y
12	0000	.0000	.0051	Ů.	0.	0.	FAS/AM/DA IF, +Z FAS/AM/DA IF, -Y
13	.0000	0000	0000	0.	0.		FAS/3A IF, -Y -Z
14	. 3300	.0018	.0004	0.	0.	J.	FAS/AM IF, -7
15	.0000	.0002	.0002	0.	0.		FAS/DA IF, +Y -Z
15	.0001	.0000	.0002				AM TUNNEL/SHEAR WE
17	.0003	.0004	.0001	.1749	.0000	.0002	
1 5	.0000	0006	.0011	. 2504	0000		
19	.0000	0007	.0001	.2021	.0001	.0001	
21	• 00 00	.0004	.0018	0 •	0.	0.	NZ TANK, +Y, LOWER
21	.0002	.0001	•0153	0.	0.	0 •	NZ TANK, FY, JPPER
22	.0000	.0008	.0204	0.	0.	0.	N2 TANK, +Z, LOHER
23	.0000	.0117	.0002	0 •	0.	0.	NZ TANK, +Z, UPPER
24	.0000	.0010	• 00 65	0.	0.	0.	NZ TANK -Z, LOWER
25 25	.7001	.0205	.0001	0.	0.	0.	N2 TANK, -Z, UPPER
27 27	.0000 .0000	.0023 .0019	.0001 .0000			.0000	CM, FWD BULKHEAD
28	• 9 0 0 0	.0019	.0000	.0025 .J182	0000	0000	CM, AFT BULKHEAD
وخ	.1000	.0003	.0014		•0001 •0063	0000	SM, FAD BULKHEAD SM, AFT BULKHEAD
30	.0003	0001	0000	0.	0.	0.	LOWER D LATCH, DA
31	.1000	.0000	.0043	j.	0.	0.	LOWER +Y TRUNNION
32	0001	.0045	.0010	0.	0.	0.	LOWER -Y TRUNNION
33	.0003	.0012	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0000	.0000	0.	0.	0.	ATM PN 6,7 IF, OUTR
₹≒	• 0000	• 0000	.0001	0.	0 •	0.	ATM PN 4,5 TF, OUTR
3.2	• 2000	.0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
2.3	• 0 0 0 0	•0000	.0000	J.	0.	0.	ATM PN 2,3 IF, OUTR
7 <u>8</u>	.0000	.0002	• 00 00	0 •	0 •	0.	ATM PN 5,7, IF, INNR
? Q	.0000	.0000	.0000	9.	0 •	0.	ATM PN 4,5 IF, INNR
49	.0000	.0000	.0000	0.	0.	1.	ATM PV 8,1 IF, INNR
41 42	•0000 •0000	.0000	.0000	ე.	0.	0.	ATM PN 2,3 IF, INNO
43	• 9 9 9 9	.0000 .0000	• 00 00 • 00 00	.0000	0000	0000	CMG, -Y SIDE
44	•0000	.0000	.0000	.0000 .0000	0000	0000.	CMG, +Y SIDE
45	.0000	.0000	0.).	.0000	.0000	CMG, +X SIDE ATM SAS, PN 1
4.5	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 1 ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	0000	0000	0.	0.	0.	0.	ATM SAS, PN 7
49	.0000	.0000	.0000	.0001	.0000		SPAR DENTER
₹ 0	•0000	.0001	.0000	.0001	.0001		GRAZCAN CENTER
SUM	.0320	.0723	.0739	.8192	.0013		•
-			- 3 ())	00176	•0013	• 0013	

TABLE A-43 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 188

TEST FREQUENCY = 12.87 HZ.

COMPONENT	GM C	GM C	GMC	GMC	GM C	GMC
NAME	(nx)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OMS SKIRT/IU/FAS	.0301	.0173	. 6185	.(536	.0013	.0008
6-FAS 02 TANKS	.0240	. J176	• 1196	€.	7 •	0.
MDA/STS/AM	.0004	. 94 9 7	-8009	.5413	.iJ38	.0102
6-AM N2 TANKS	.0004	. 1926	.0248	6 •	o.	0.
COMMAND/SERVICE MOD.	.0011	. ^644	.9116	.6336	. 69 0 4	.0036
DEPLOYMENT ASSEMBLY	.0014	.0131	.9157	G .	0.	0.
ATH-RACK, CMGS, 4-SAS	.0000	.9901	.9001	.0000	.0000	.0000
ATM-SPAR CENTER	.0000	. 20 00	.0000	.0300	.0032	8.
ATM-GRAZCAN CENTER	.0000	.0000	.0000	.0001	.0002	.0000
SUM	.0276	. 2459	.0812	.6278	.0329	· C147

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BRIONS SKIRT/IU/FAS	.3810
6-FAS 02 TANKS	.0512
MDA/STS/AM	•5943
6-AM N2 TANKS	.1278
COMMAND/SERVICE MOD.	.1147
DEPLOYMENT ASSEMBLY	.0392
ATM-RACK, CMGS, 4-SAS	.0001
ATM-SPAR CENTER	.0003
ATM+GRAZCAN CENTER	.0033

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TABLE A-44 SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

PUN NO. 663

FREQUENCY = 12.87

TEST MODE

188

.2459 .

.0812

.6278

.0147

.0029

SUM

. 0275

4775 GMC GMC GMC. GMC SMC GMC NODE VO. (XC) (DY) (DZ)(TX) (TY) (TZ) DESCRIPTION .0330 . 3461 .0007 .0012 .0001 .0004 BASE RNG/DWS SKIPT 1 .? -. 3000 -.0000 .0015 . 2053 -.0001 .0000 OWS/IJ INTERFACE 3 .0001 .0002 .0098 .0076 .0007 .0004 TU/FAS INTERFACE 14 .0743 .0023 G. 0. FAS 02 - BOTL 1, +Y +Z .0056 3. 5 .0094 .0013 -.0000 0. FAS 02 30TL2,+Y +Z J. 0. 0. 5 .0018 .0353 3. 0. .0011 FAS 02 907L3,-Y +Z . 0044 0. -.0000 .0013 0. 9. FAS O2 BOTL4,-Y +Z .0008 FAS 02 BOTLF, -Y -Z ą .0033 .0039 0. O. 0. a .0004 .0048 -.0000 0. 3. FAS 02 30716,-Y -Z .0041 10 .0000 .0000 0. FAS/AY/DA IF, +Y ŋ. 9. 11 . 9 0 9 9 .0060 O. FAS/AM/OA IF. +Z -.0000 9. 0. .0000 .0024 FAS/AM/DA IF, -Y 12 .0000 9. 0. 0. FASIDA IF, -Y -Z 17 -.0000 -.0000 -.0362 9. 0. 0. 14 .0000 .0000 .0001 0. FAS/AY IF. - Z Û. 0. 15 FAS/DA IF, . 2020 -.0000 .0005 +Y -7 0. 0. 0. 15 .0018 .0000 .0023 AM TUNNEL/SHEAR WB .0001 . 0347 .0031 17 .0001 .0002 .0001 .0003 . 1439 .0016 AM TUNNEL/STS IF .0056 MDA/STS INTERFACE 19 .0000 .0068 .0000 .2060 .0003 13 49321 .0005 .1566 .0004 .0008 MDA GONE/CYL ITRFC .0001 23 .0519 .0004 ŋ **.** N2 TANK, +Y, LOWER .0000 Э. 0. .0933 9. 0. NZ TANK, TY, UPPER 21 .0027 .0099 9. 23 - . 0 0.0 0 .0026 N2 TANK, +Z, LOWER .0139 ŋ. 0. J . 23 .0000 .0061 .0001 0. N2 TANK, +Z, UPPER ð. 0. 24 NZ TANK -Z, LOWER .0000 .0120 .0005 0. 0. 0. 2= .0274 .0001 NZ TANK, -7, UPPER .0000 ŋ. 0. 3. 25 .0007 CM, FWD BULKHEAD .7100 -.0000 .0003 .0001 .0036 27 .0101 .0018 CM, AFT BULKHEAD .0000 .0422 .0023 .0002 28 .0005 .0089 .0348 .0003 .0000 .0003 SM, FWD BULKHEAD .0188 .0008 SM, AFT BULKHEAD 29 .0005 .0174 .0008 .0001 5 N -.0001 .0021 .0005 LOWER D LATCH. DA J. 0 . . 0. 34 .0003 .0142 0. 0. -.0029 LOWER +Y TRUNNION 0. 0. 32 .0004 .0120 .0008 0. 0. LOWER -Y TRUNNION 0. 73 .0908 .0019 .0002 0. EREP PACKAGE C.G. 0. 74 .0000 .0000 . 0000 0. 0. O. ATM PN 6.7 IF.OUTR 7 F .0000 .0000 .0000 ATM PN 4,5 IF, OUTR 0. 0. 0. RF. .0000 .0000 .0000 0. 0. ATM PN 8.1 IF, OUTR J . 77 . 3000 .0000 .0000 3. ATM PN 2,3 IF, OUTR 0. 3. .0000 38 -.0900 .0000 9. ATM PV 5.7 IF, INNR 0. 0. 73 .0000 .0000 .0000 0. 0. 0. ATM PN 4.5 IF. INNR 40 0. . 2002 .0000 .0000 ATM PN 8,1 IF, INNR 0. 0. 9. ATM PN 2.3 IF. INNR 41 .0000 .0000 .0000 J . . .0000 10 .0000 .0000 .0000 .0000 CMG, -Y SIDE .0000 43 .0000 .0000 .0000 .0000 .0000 CMG, +Y SIDE . 9900 44 .0000 .0000 .0000 .0000 .0000 .0000 CMG, .+Y SIDE 9. 45 .0000 .0000 0. ATM SAS. PN 1 0. 0. 45 0. .0000 9. ATM SAS, PN 3 .0000 O. 0. 47 ATM SAS, PN 5 -.0000 -.0000 0. 0. 0. ATM SAS, PN 7 48 -.0000 -.0000 0. 0. 0. 3. .0000 SPAR CENTER 43 .0000 .0300 .0003 .0000 .0002 .0000 .0000 .0000 GRAZCAN CENTER 59 .0000 .0002 . 2000 ----____ ------------

TABLE A-45 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 19A

TEST FREQUENCY = 13.30 HZ.

COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0002	.0117	.11365	.6364	.0005	.0029
5-FAS 02 TANKS	.0023	.0110	·G178	Û •	0.	0 •
MDA/STS/AM	.0006	.1268	.0172	.(163	.0359	·G124
5-AM N2 TANKS	.6604	.4473	.9840	0.	0.	0.
COMMAND/ SERVICE MOD.	.0029	. 1507	.0511	.6365	.1329	.6109
DEPLOYMENT ASSEMBLY	.0010	.0097	.0035	ũ •	0.	0.
ATH-RACK, CMGS, 4-SAS	.0000	.2001	.0000	.0000	• GO O O	.0000
ATM-SPAR CENTER	.0900	.0000	.0090	.0364	.0397	0.
ATH-GRAZCAN CENTER	.0000	0386	.0000	.0305	.0997	.0000
•						
SUM	.0075	• 75 7 3	•1902	.081	.9107	.0262

BR/OWS SKIRT/IU/FAS	.0222
6-FAS 02 TANKS	0311
MDA/STS/AM	•1693
6-AM N2 TANKS	•5316
COMMAND/SERVICE MOD.	•2290
DEPLOYMENT ASSEMBLY	. 9142
ATM-RACK, CMGS, 4-SAS	.0101
ATM-SPAR CENTER -	.0011
ATM-GRAZCAN CENTER	.0013

A-49
TABLE A-46 SEMEPALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 19A RUN NO. 586 FREQUENCY = 13.30

						•	
4205	SMD	GMC	GMC	GMC	GMC	GMG	NODE
้พา.	(xc)	(DY)	(07)	(TX)	(TY)	(TZ)	
		,	(07.7	(()	(, , ,	(:2)	2
1	• 0000	.0049	.0003	.0000	.0004	.0013	BASE RNG/DWS SKIRT
2	.0000	.0010	.0013	.0000	0001	.0013	OWS/IU INTERFACE
7	.3032	.0025	.0038	.0003	.0002	.0015	IU/FAS INTERFACE
4							
r:	.0001	.0001	• 9 9 0 8) .	0.	,0 • .0 •	
5	.0000	.0016	.0017	0.			
	.0922	.0020	.0048	0•	0.	0.	FAS 02 BOTL3,-Y +Z
7	0000	.0018	.0013	0.	0.	0.	
9	.0000	.0038	.0010	0.	0 •	0.	FAS 02 30TL5,-Y -Z
7	.0000	.0718	.0081	J.	0.	0.	FAS 02 BOTL6,-Y -Z
13	3030	.0000	.0306	0.	3.	0.	FAS/AM/DA IF, +Y
11	0000	.0007	• 00 00	0.	0 •	0 •	FAS/AM/DA IF, +Z
12	. 0000	.0109	0000	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0000	0000	.0000	J •	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0014	.0000	0.	0 •	0.	FAS/AM IF, -Z
15	.0000	• 6005	.0004	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0000	.0003	.0004	.0006	.0000	.0007	AM TUNNEL/SHEAR WB
1 -	.0001	.0071	•0002	.0011	.0013	.0017	AM TUNNEL/STS IF
18	.0001	.0424	• 6039	. 3029	.0036	.0100	MDA/STS INTERFACE
19	.0004	.0770	.0128	.0017	•0009	0000	MDA CONS/CYL ITREC
23	. 0 0 0 0	. 4251	.0182	3.	0.	9.	N2 TANK, +Y, LOWER
21	•9093	.0013	.0005	ð.	0.	0.	NZ TANK, FY, UPPER
22	.0001	.0081	.0102	J.	0.	0.	N2 TANK, +7, LOWER
23	.0003	.0000	.0541	J.	0.	0.	N2 TANK, +Z, UPPER
24	• 0 0 0 0	.0122	.0003	3.	0.	0.	NE TANK -Z, LOWER
25	. 0000	.0006	.0005	9 •	0.	0.	NE TANK, -Z, UPPER
25	.0001	. 0005	.0033	.0004	.0010	.0021	CM, FWO BULKHEAD
27	.0002	.1011	.0446	0003	.3007	.0057	CM, AFT BULKHEAD
2 8	.0014	.0091	.0022	.0005	.0001	.0005	SM, FND BULKHEAD
20	.0012	.ŋ₹99	.0111	.0000	.0011	.0024	SM, AFT BULKHEAD
2 00 = 30	0301	.0089	.0007	J.	0.	0.	LOWER D LATCH, DA
	0001	0019	.0035	J.	0.	0.	LOWER +Y TRUNNION
	. 7008	.0025	0007	0.	0.	0.	LOWER -Y TRUNNION
PAGE	.0003	.0002	.0001	0.	8.	3.	EREP PACKAGE C.G.
A 0074	.0000	.0000	.0000	3.	0.	9.	ATM PN 5,7 JF, OUTR
H	. 6 7 6 2	.0000	.0000	0.	0.	0.	ATM PN 4,5 IF, OUTR
GINAL POOR	.0000	.0200	.0000	j.	0.	0.	ATM PN 8,1 IF, OUTR
B 2 37	0000	.0000	.0000	0.	0.	J .	ATM PN 2,3 IF, OUTR
ORIGINAL POOR 22 23 24 25 25 25 25 25 25 25 25 25 25 25 25 25	.3000	.0000	.0000	3.	0.).	ATM PN 6,7 IF, INNR
50° 2 39	.0000	.0000	.0000	3.	0.	0.	ATM PN 4,5 IF, INNR
49	.0000	• 0 9 0 0	.0000	.0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0000	.0000	.0000	0.	0.	9.	ATM PN 2,3 IF, INNR
42	.0000	.0000	.0000	.0000	. 2000	.0000	CMG, -Y SIDE
63	.0000	.0000	.0000	.0000	.0000	.0000	CMG, AY SIDE
44	.0030	.0000	.0000	.0000	•0000	.0000	OMG, +X SIDE
45	.0033	.0000	_	3.	• 0000	0.	
45	• 0000	.0000	0.		0.	0.	-
47 47				ე. n			
	- 0000 - 0000	.0000	0.	0.	0.	0 •	ATM SAS, PN 5
4 B	0000	0000	0.	9.	0.	0.	ATM SAS, PN 7
և գ ೯ դ	.9936	0000	.0000	.0004	.0007	•0000	
* ij	.0003	.0000	•0000	.0005	•0007	• 0 0 0 0	GRAZGAN CENTER
/SUM	.0775	.7573	.1902	0.004	0407	0000	• 7
1303	• 0 3 / 5	• (713	• 1902 •	.0081	.0107	. 0252	- .

TABLE A-47 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 20A

TEST FREQUENCY = 13.68 HZ.

C OMPONE NT	GMC	GMC	GMC	GMC	GM C	GMC
NAME	(DX)	(DA)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0007	.0381	. 30 87	.0313	.r001	. 3313
5-FAS 02 TANKS	.0043	.0145	.0137	O.	0.	0.
MDA/STS/AM	.0016	.0612	• 14 94	.0005	.6293	.0019
5-AM N2 TANKS	.0040	. 3389	• 15 19	€.	0.	0.
COMMAND/SERVICE MOD.	.0019	. 5367	• 16 65	.0038	.0063	. 6011
DEPLOYMENT ASSEMBLY	.0003	.0931	.0312	G •	û.	0.
ATM-RACK, CMGS, 4-SAS	.0925	.3093	• GO 21	.6000	.0000	.0000
ATM-SPAR CENTER	.0000	.0196	.0006	.6316	.065	0.
ATH-GRA/CAN CENTER	.0001	.0000	.0001	.[714	.0154	.0012
SUM	.0148	.4335	• 49 36	.0049	.0475	.0056

BR/OWS SKIPT/IU/FAS	.0202
6-FAS OZ TANKS	.0324
MDA/STS/AM	.2433
6-AM N2 TANKS	•4649
COMMAND/SERVICE MOD.	.2133
DEPLOYMENT ASSEMBLY	.3046
ATM-RACK, CMGS, 4-SAS	0050
ATM+SPAR CENTER	.3681
ATM-GRAZCAM CENTER	.0(82

A-51
TABLE A-48 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM.

RUN NO. 627

TEST MODE

PL?

.4335

.0148

.4936

.0049

. 1475

.0055

. 20 A

NOTE 540 GMC GMC GMC SMC GMC NODE (D7) V). (YC) (YY) (TX) (TY) (TZ) DESCRIPTION .0009 BASE RNG/DWS SKIPT .0002 .0927 .0358 .0003 .0001 1 .2 .0000 .0008 .0311 .0005 -.0300 -.0000 OWS/IU INTERFACE 3 .0005 .0000 .0014 .0013 .0004 -.0000 IU/FAS INTERFACE 4 .0002 F45 02 .0001 .0003 0. 0. BOTL1.+Y +Z Ū. _ .0028 .0015 .0038 0. FAS 02 301L2.+Y +Z 0. a. 5 . 1922 .0023 .0012 Û. 0. 0. FAS 02 90TL 3.-Y +Z .0048 .0011 .0018 J. 0. 9. F45 02 901L4 - Y + Z 8 -.0000 .0050 -.0000 FAS 02 307L5,-Y -Z O. 9. Q. q .0038 .0001 .0035 ŋ. FAS 02 30TL6,-Y -Z 0. 0. 19 -.0000 0. -. 3001 .0005 0. FAS/AM/DA IF. +Y 11 0. 3. .0002 -.0000 .0001 ŋ. FAS/AM/DA TF, +Z 1? .0000 .0013 .0000 J. 0.). FAS/AM/DA IF. -Y 13 .0000 .0002 .0001 9. FAS/DA IF. 0. 0. -7 .0012 J. FAS/AY IF, 14 .0002 .0001 0. 15 . 3333 .0001 .0003 FAS/DA IF. +Y -Z Э. 9. .0000 .0010 .0012 .0002 15 .0062 -.0000 AM TUNNELISHEAR WB 17 .0002 .0113 .0013 .3697 .0038 .0000 AM TUNNELISTS IF 13 .0903 .0234 .0317 . 3004 ·J197 .0018 MDA/STS INTERFACE 19 .0255 .1102 -.0006 MDA CONEZCYL ITREC .0004 .0945 -.0000 20 . 2538 . 9255 M2 TANK, +Y, LOWER .0005 ŋ. 0. ŋ. 0. 0. .0361 .000? NZ TANK, +Y, UPPER 21 . 2001 0. 22 . 9 7 9 8 .0049 .0095 0. 0. 0. N2 TANK, +Z, LOWER 23 N2 TANK, +Z, UPPER .0319 .0001 .0123 ŋ. 0 . 0. 24 .0031 .0907 .0002 0. Э. a. N2 TANK -Z, LOWER 25 9. .0304 .0009 .0135 N2 TANK, -Z, UPPER 0. 25 -.0901 .0165 .0001 .0034 .0007 CM, FWD BULKHEAD .0005 27 . 1020 .0243 . 1074 .0000 .0013 .0001 CM. AFT BULKHEAD 28 •0370′ .0021 . 0055 .0000 .0005 -.0000 SM, FWD BULKHEAD .0004 20 .0000 .0098 .0369 .0007 .0011 SM. AFT BULKHEAD 7.) LOWER D LATCH, DA .0000 .0039 -.0000 9. 0. 0. -.0005 . 0014 LOWER +Y TRUNNION 31 .0001 0. 0. Э. 72 .0003 -.0003 -.0002 0. 0. a. LOWER -Y TRUNNION 33 .0000 0. FREP PACKAGE C.G. .0000 .0000 0. 0. 34 .0000 .0000 .0007 0. 0. O. ATM PN 6,7 IF, OUTR マニ . 0000 ŋ. ATM PN IF, OUTR .0000 .0003 0. 0. 4,5 35 8,1 .0000 .0000 .00C1 0. ATM PV TF, OUTR 0. 0. 77 2,3 .0000 . 1000 .0002 ù. 0. a. ATM PN IF, OUTR 7 9 .0054 .9301 .0004 0. 0. 0. ATM PN 5.7 IF, INNR 43 ATM PN IF, INNR .0005 -.0000 .0001 Э. 0. 0. 4.5 ATM PV 8,1 49 -.0001 3. 0. ŋ. .0008 .0000 IF. INNR 41 0. ATM PN 2,3 IF, INNR .0004 .0092 .0001 0. 0. 42 .3001 .0000 .0000 -.0000 .0000 .0000 CMG. -Y SIDE 43 .0000 .0000 CMG, +Y SIDE . 2000 .0000 .0000 .0001 .0000 44 .0000 .0000 .0000 CMG, +X SIDE .0001 .0001 45 ATM SAS, PN 1 .0990 .0000 0. **0** • 0. 0. 0. 0. 45 .0000 .0000 0. ATM SAS, PN J. 47 .0000 .0000 0. 0. J. ATM SAS, PN 5 0. 4.8 0. 0. ATM SAS, PN 7 .0000 0 . . .0000 O. .0010 .0055 .0000 SPAR CENTER 49 .0000 .0006 .0000 .0001 ΕĐ .0000 . DC 14 .0054 .0012 GRAZCAN CENTER .0001

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FREQUENCY = 13.63

TABLE A-49 ORBITAL CONFIGURATION MODAL SURVEY TEST HODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 21	7	TEST	FREQUE	NCY =	14.55 HZ.	,
COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(₹X)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0001	.0923	. 09 32	.0000	.0001	.0035
6-FAS 02 TANKS	.0025	.0958	.0978	0 •	7 •	0 .
MDA/STS/AM	.0000	.1102	. 04 9 0	.0216	.0341	.0160
5-AM N2 TANKS	.0023	•5918	.0310	û.	J.	9 .
COMMAND/SERVICE MOD.	.0027	.1158	.0210	.1356	.0013	.0374
DEPLOYMENT ASSEMBLY	.0001	0001	. 09 45	Ú.	0.	9.
ATM-RACK, CMGS, 4-SAS	.0002	.0301	.0093	.0306	.(000	.0000
ATM-SPAR CENTER	.0000	. 20 08	. 00 06	. 6996	.003	0.
ATM-GRA/CAN CENTER	.0000	.0361	.0001	.001	.0304	.0000

SUM	.0079	. 8269	.1780	.0273	·C061	.0239

BR/OWS SKIRT/IU/FAS	.0063
6-FAS 02 TANKS	.0161
MDA/STS/AM	.1919
6-AM N2 TANKS	•6251
COMMAND/SERVICE MOD.	.1547
DEPLOYMENT ASSEMBLY	.0(44
ATM-RACK, CMGS, 4-SAS	.0016
ATM-SPAR CENTER	.0003
ATM-GRA/CAM CENTER	.00.07

SUM

.0079

. A 2 6 9

.1080

A-53
TABLE A-50 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	WOUE	21 A	30N NO.	633	FREQUEN	ICY = 14.55
							•
NODE	୍ୟେମ	- GMC	GMO	GMC	SMC	GMC	ЗСОЙ
NO.	(ox)	(DY)	(DZ)	(TX)	(TY)	(17)	
1	. 9 9 0 0	.0704	.0023	3003	.3030		BASE RNG/DWS SKIRT
2 3	.0000	. 0004	.0001	.0000	0000		OWS/TU INTERFACE
	• 0 0 0 0	.0008	0007	•0000	.0001		TU/FAS INTERFACE
4 5	•0002 •0000	.0014 .0002	.0005 .0018	0.	0.	0. 0.	FAS 02 BOTL1,+Y +Z FAS 02 BOTL2,+Y +Z
, E	.0007	.0014	.0015	3.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0012	.0001	.0011	0.	3.	0.	FAS 02 30TL4,-Y +Z
Я	.0002	.0025	.0304	0.	9.	0.	FAS 02 BOTL5,-Y -Z
o,	. 0 1 0 0	.0002	.0025	0.	0.	0.	FAS 02 BOTL6, -Y +Z
10	0111	.0000	0000	0.	0.	0.	FAS/AM/DA IF, +Y
11	• 0 0 0 0	.0004	.0000	0.	0.	0 .	FAS/AM/DA IF, +Z
12	-•0 000	.0001	. 0001	0 •	0•	0 •	FAS/AM/DA IF, -Y
13	-•3333	.0701	.0001	9.	0.		FAS/DA IF, -Y -Z
14	• 0 0 0 0	.0001	.0000	9•	0.	0.	FAS/AM IF, -Z
1 T	• 0 0 0 0	0000	.0000	0.72	3.	0.003	FAS/DA IF, +Y -Z
15 17	• ជី ជី ជី ជី	•0000 •0016	.0001 .0010	.0032 .0090	•33CI	.0003	AM TUNNEL/SHEAR WB AM TUNNEL/STS IF
1.9	•0000 •0000	.0254	.0153	.0054	.0005 .0030		MDA/STS INTERFACE
13		0835	• 0237	.0039	.0000	.0005	
5.C	.0003	.0015	.0035	0.	0.	J.	N2 TANK, +Y, LOWER
21	0015	. 5264	.0019	0.	0.	0.	NZ TANK. +Y. UPPER
2?	.0001.	.0583	.0000	0.	0.	Ð.	NE TANK, +Z, LOHER
23	.0001	.0907	.0231	0.	0.	J	N2 TANK, +Z, UPPER
24	.0001	.0030	.0018	9 •	0.	0. •	N2 TANK -7, LOWER
25	.0002	.0120	0005	0.	0.	0.	NO TANK, -Z, UPPER
25	.0061	.0068	.0022	.0005	.0005	.0027	CM, FWO BULKHEAD
27 28	0000	.0797 .0050	.0114	.0009			CM, AFT BULKHEAD
5₫ ₹3	.0014 .0012	• 0050 • 02 53	.0022 .0052	.0013	.0001 .0000	.0005	SM, FWD BULKHEAD SM, AFT BULKHEAD
30	.0012	0003	0000	0.	0.	0.	LOWER D LATCH, DA
71	0001	.0001	.0007	0.	0.	9.	LOWER +Y TRUNNION
32	.0001	.0001	.0037	9.	0.	0.	LOWER -Y TRUNNION
रर	.0000	.0001	.0000	0.	0.	0.	EPEP PACKAGE C.G.
34	• 0 0 0 0	.0000	0000	0.	û • ·	0.	ATM PN 6,7 IF, OUTR
₹ 5	1000	.0000	.0000	0.	0.	J .	ATM PN 4,5 TF, OUTR
36	00003	.0000	.0002	0.	0 •	0 •	ATM PN 8,1 IF, OUTR
37	.0700	.0000	.0000	J.	9 •	0.	ATM PN 2,3 IF, OUTR
3,9	.0000	.0000	0000	0.	0.	g •	ATM PN 6,7 IF, INNR
3.3 6.0	.0000	• 7000	0000 .0000	0.	0.	J.	ATM PN 4,5 IF, INNR
41	•0001 •0000	0000 -0000	.0000	0. 0.	0.	0.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	.0009	.0000	0000	.3000	•3000	.0000	CMG, -Y SIDE
43	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0000	.0000	.0000	0000	.0000.	.0000	CMG, +X SIDE
45	0000	0000	0.	0%	0.	0.	ATM SAS; PN 1
45	.0000	.0300	0.	3.	0.	0.	ATM SAS, 3N 3
47	. 0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
40	• 0000	.0000	.0000	.0000	.0003	.0000	
£g	• 0 0 0 0	.0001	.0001	.0001	.0094		GRAZOAN CENTER
							-

.0051

.0239

.9273

TABLE A-51 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 228

TEST FREQUENCY = 15.40 HZ.

COMPONENT	GMC	GMC	GM C	GMC	GM C	GM C
NAME	(מאס)	(AQ)	(DZ)	(TX)	(TY)	(YZ)
BR/ONS SKIRT/IU/FAS	.0010	.0108	.0119	.0051	.0029	.0048
6-FAS 02 TANKS	• 1326	.0593	• 06 8E	0.	0 •	0 •
MDA/STS/AM	.0002	.1203	·0154	.0750	.0051	.0295
6-AM N2 TANKS	.0002	.1360	.1081	0.	£ .	0.
COMMAND/SERVICE MOD.	.0023	.1155	• C236	.0108	-8937	.0102
DEPLOYMENT ASSEMBLY	.0138	.0260	.0048	6 •	0.	3.
ATM-RACK, CMGS, 4-SAS	.0032	.6031	.0002	3600.	.0000	.0000
ATI4-SPAR CENTER	.0000	. 3300	0000	.0321	.0000	0.
ATM-GRAZCAN CENTER	.0001	.0001	.3300	.0128	• 69 3 0	.0000
					<u></u>	
SUM	• 15 0 3	• 4681	• 23 27	•0957	.6388	• 0445

BR/OWS SKIRT/IU/FAS	.0364
6-FAS 02 TANKS	.2696
MDA/STS/AM	• 2455
6-AM N2 TANKS	.2443
COMMAND/SERVICE MOD.	.1630
DEPLOYMENT ASSEMBLY	.0446
ATM-RACK, CMGS, 4-SAS	.0004
ATM-SPAR CENTER	.0021
ATH-GRAZCAN CENTER	.0030

TABLE A-52 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM TEST MODE

RUN NO. 654

FREQUENCY = 15.41

22 B

SUM

.1503

.4681

.2327

.0957

.0088

. 0445

GMC 430= SMC GMC GMC SMC GMC --NODE Nn. (DX) (DY) (07) (TX) (TY) (TZ) DESCRIPTION .0000 .0901 .0031 .0048 .0016 .0039 BASE RNG/OWS SKIRT 2 -.0000 .0024 .0028 .0001 .0008 .0009 OWS/IU INTERFACE ٠ ۲ .0018 .. 0033 . 1004 .0002 .0005 -.0000 IU/FAS INTERFACE 4 .0099 .0138 .0075 0. û. 0. FAS 02 30TL1,+Y +Z Ξ 0. 0. .0406 .0182 .0150 O. FAS 02 BOTL 2,+Y +Z 5 .0228 .0009 -. 00 CO 0. ŋ. Э. FAS 02 BOTL 3 .- Y + Z .0024 -.0000 .0021 ŋ. 0. F45 02 0. BOTL4.-Y +Z 9 .0425 .0180 .0156 0. 0. Û. FAS 02 907L5.-Y -7 Q .0274 .0363 .3184 Э. 0. 0. FAS 02 BOTLS, -Y -Z 10 .0004 .0002 -.0000 **)** . J. 0. FAS/AM/DA IF. +Y 11 .0002 .0012 .0015 0. FAS/AM/DA IF, +Z 0. 0. 12 .0001 .0017 .0227 Э. 0. 0. FAS/AM/DA IF. -Y 13 -.0000 .0016 -.0013 0. 0. FAS/DA IF, 0. -Y -Z 14 .0331 .0001 .0006 Э. 0. FAS/AM IF. -7 0. 15 . 0000 .0000 .0000 O. 0. FAS/DA IF, 0. +Y -Z 15 .0000 .0062 .0021 .0079 .0000 .0001 AM TUNNEL/SHEAR WB 17 .0000 .0046 .0064 .0259 .0012 .0069 AM TUNNEL/STS IF 18 .0001 .0093 .0000 .0251 .0021 .0211 MDA/STS INTERFACE 13 . 9303 .0068 .1903 . 3162 .0017 .0014 MDA CONE/CYL ITRFC 29 .0000 .9947 .0172 0. 0. J . N2 TANK, +Y, LOWER 21 .0001 .0330 .0110 **)** . 9. N2 TANK, +Y, JPPER 0 . 22 .0303 .0005 .0417 N2 TANK, +Z, LOWER **)**. 9. 0. 23 .0000 .0302 .0183 J. N2 TANK, +Z, UPPER 0. 0. 24 .3031 .0261 .0366 **0** . 0. J . N2 TANK -7. LOWER 25 .0000 .0002 0. . 6249 Э. 0. N2 TANK, -Z. UPPER 25 .0000 .0250 .0047 .0022 .0038 CM, FAD BULKHEAD .0034 27 -. 9000 . 9244 .0672 .0175 .0002 .0057 CM, AFT BULKHEAD 28 .0018 .0012 .0001 .0002 -.0000 .0004 SM, FWD BULKHEAD 29 .0005 .0211 .0013 .0041 .0001 .0003 SM, AFT BULKHEAD 3.0 . 3004 .0301 .0000 ŋ. 0. 0. LOWER D LATCH, DA 31 .0100 -.0006 .0063 0. 0. 0. LOWER +Y TRUNNION 32 .0031 -.0338 -.0014 0. **)** . 0. LOWER -Y TRUNNION 77, .0003 .0002 .0002 3. 0. 0. EREP PACKAGE C.G. 74 .0000 .0000 O. .0001 9. 0. ATM PN 6,7 IF, OUTR **₹**5 -.0000 .0000 .0000 0. 0. 0. ATM PN 4,5 IF, OUTP 75 . 2000 .0000 .0000 0. 0. 0. ATM PN 8,1 IF.OUTR 77 . 3503 .0000 .0000 0. 0. ATM PN 2,3 IF, OUTR Э. 38 .0000 .0000 .0000 0. 9. 0. ATM PN 6,7 IF, INNR 73 . 3030 . 2000 .0000 Э. Û. 0. ATM PN 4,5 IF, INNR 40 .0333 .0000 .0000 0. 9. ATM PN 8,1 IF, INNR 0. 41 .0000 .0000 .0000 0. 0. ATM PN 2,3 IF. INNR 42 . 0000 .0000 .0000 .0000 .0000 CMG. -Y SIDE .0000 43 .0000 .0000 .0000 .0000 -.0000 .0000 CMG, +Y SIDE 44 . 9399 . 11100 .0000 -.0000 .0000 .0000 CMG, +X SIDE 45 -.0000 -.0000 0. J. 0. 0. ATM SAS, PN 1 45 .0000 . 0000 0. 0. ŋ. J. ATM SAS. PN 3 47 .0000 .0000 0. 0. 0. ATM SAS, PN 5 0. 49 .0000 .0000 0. 0. ATM SAS, PN 7 0 . 69 . 2000 .0021 . 2000 -.0000 .0000. .0000 SPAR CENTER 5.0 .0001 .0001 .0000 .0028 .0000 .0000 GRAZCAN CENTER ------------____

TABLE A-53 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 22	TEST FREQUENCY = 15.78 HZ.					
COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(BX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0030	.0111	. 2166	.[]12	.C100	.0354
5-FAS 02 TANKS	• 2 30 9	.0753	. 0449	0 •	C •	0 •
MDA/STS/AM	.0030	.1061	. 05 92	.0100	.0225	.0165
5-AM N2 TANKS	.0011	.0170	.0747	0.	Û.	0.
COMMAND/SERVICE MOD.	.0113	. 15 45	. 03 45	.0225	· L056	.0158
DÉPLOYMENT ASSEMBLY	.0192	.0183	.0015	• 3	0 •	8 •
ATM-RACK, CMGS, 4-SAS	.0013	.0022	.0311	.000	.0300	.0000
ATM-SPAR CENTER	. 2002	.0000	.0000	.0006	.C397	0 •
ATM-GRAZCAN CENTER	•0003	. 1002	.0001	.0008	.0007	.0002
				***		***
SUM	. 2703	• 3849	• 23 22	• 6352	.0395	•[379

BRIONS SKIRTIIU/FAS	.0474
6-FAS 02 TANKS	.3511
MDA/STS/AM	.2173
6-AM N2 TANKS	. 3928
COMMAND/SERVICE MOD.	.2437
DEPLOYMENT ASSEMBLY	. 1390
ATM-RACK, CMGS, 4-SAS	.0047
ATM-SPAR CENTER	.0015
ATM-GRA/CAN CENTER	.0023

TABLE A-54 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREDOM

TEST MODE 22A RUN NO. 506 FREQUENCY = 15.78

พวกร	GMO	GMC	GMC	<u>GMC</u>	CM C	C M C	
V 1.	ָרָאָתָי) ַ						DESCRIPTION
•							
	• 3003	.0008	.0035	.0012	.0058	.0044	BASE RNG/DWS SKIRT
2	0001	.0038	.0335	.0000	.0021	.0009	OWS/TU INTERFACE
3	.0019	• 9934					TU/FAS INTERFACE
4	.0085	.0174	.0052	0.	0.		FAS 02 BOTL1,+Y +Z
5	.0931	.0055	. C175	3.	Ŭ •	Ò.	FAS 02 BOTL2,+Y +Z
5 7	. 0 9 9 1	• <u> </u>		9.	0.		FAS 02 801L3,-Y +Z
	0145	0000		j.	0.		FAS 02 BOTL4,-Y +Z
8 a	.9738	.0379		.J •	· U •	0 .	FAS 02 80TL5,-Y -Z FAS 02 80TL6,-Y -Z
13	.0538 .0903	.0139 0001	.0001 .0005	•	0.		FAS/AM/DA IF, +Y
11	• 0 3 0 3	.0029	•0005			0.	FAS/AM/DA IF, +Z
1?	.0001	.0027	.0042	0.	0.		FAS/A4/04 IF, -Y
13	.0000	0013	.0005).	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0010	.0001).).	0.	0.	FAS/AM IF, -Z
15	.0000	0000	.0001	3.	0.	0.	FAS/34 IF, +Y -Z
1=	.0002	.0002	.0032	.0014	.0000	.0000	AM TUNNEL/SHEAR WA
1-	.0004	.0002	.0042	.0045	.0042	.0030	AM TUNNEL/SHEAR WB AM TUNNEL/STS IF MDA/STS INTERFACE
. 18	.0012	. 9235	.0003	. 3021	.0129	.0132	MDA/STS INTERFACE
13	.0312	.0822	.0515	.0021	.0355	.0002	MDA CONE/CYL ITREC
23	.0006	.0000	.0115	0 •	0. 3	3.	M2 TANK + + Y . LOWER
21	.0001	.0000	.0079	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0001	0076	.0014	0.			N2 TANK, +Z, LOWER
23	•0000	.0782	.0105	9 • :	0.		N2 TANK, +Z, UPPER
24	.0000	.0010	.0193	0 • :	0 •	0 .	N2 TANK Z , LOWER
2E /	.0002	.0001	.0243	3.	C.	0.	N2 TANK, -Z, UPPER
25	.0045	.9061	.0001	.9982	.0012	.0050	CM, FWD BULKHEAD
27	0000	.0962	.0001	.0080	00000	.0052	CM, AFT BULKHEAD
28	• 7 049	.0148		.0002	.0005	.0013	SM, FWD BJLKHEAD
20	.0020	. 9374					SM, AFT BULKHEAD
30	. 3021	.0231	.0019		0.		LOWER D LATCH, DA
31	.0137	.0003	0004	0.	0.		LOWER +Y TRUNNION
32	.0914	0051	0001	9.	U •		LOWER -Y TRUNNION
77	.0020	.0000	0000	0 ,ه	J •		EREP PACKAGE C.G.
34			.0001				ATM PN 6,7 TF, OUTR
35	.0004	0000	.0001	0.	0.	G •	ATM PN 4,5 IF, OUTR
35 37	.0000	.0000	. • 00 0 3	0.	0.	0.	ATM PN 8,1 IF, OUTR
₹ 8	.0003 0000	.0002 .0012	.0000 .0000	0.	0. 0.	9. 0.	ATM PN 2,3 IF, OUTR ATM PN 5,7 IF, INNR
₹0	.0004	.0003	.0001	0.	0.	0.	ATM PN 4,5 IF, INNR
40.	0000	.0001	.0002	0.	0.	0.	ATM PN 8,1 TF, INNR
41	0000	.0001	.0000	0.	0.	0.	ATM PV 2,3 TF, INNR
42	.0001	.0001	• 0000	.0000	0000	.0000	CMG, -Y SIDE
43	.0000	.0001	. 3001	.0000	.0000		CMG, +Y SIDE
44	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	G.	0.	0.	0.	ATM SAS, PN 1
45	.0000	.0000	0.	0 • *	0.	0.	ATM SAS, PN 3
47	3000	0000	D.	0.	0.	0.	ATM SAS, PN 5
48	.0700	.0000	0.	0.		0.	ATM SAS', PN 7
49	.0002	.0000	.0000	.0006	.0007		SPAR CENTER
፣ 0	.3903	.0002	.0001	.0008	.0907	.0002	GRAZCAN CENTER
SUM	.2703	.3849	. 2322	.0352	.0395	.0381	•

TABLE A-55 ORBITAL CONFIGURATION MODAL, SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

T	FC	T :	MO	DE	NO.	234

TEST FREQUENCY = 16.20 HZ.

•						
COMPONENT	GM C	GM:C	GM C	GMC	GM C	GMC
NAME	(DX)	, (DY)	(DZ)	(TX)	(TY)	(TZ)
BR/ONS SKIRT/IU/FAS	.0042	.0390	.0348	.6778	. 6127	.0018
5-FAS 02 TANKS	- 17 97	• ¢ 5 32	.0872	0 •	9 • •	ŋ .
MDA/STS/AM	.0009	.0323	•J858	.0042	.0386	.0004
6-AM N2 TANKS	.0031	. 01 26	•298C	0.	0.	0.
COMMAND/SERVICE MOD.	.0019	. 60 35	.1123	.0091	.0041	.0002
DEPLOYMENT ASSEMBLY	.0108	.0973	. 00 0 8	0.	9.	0 •
ATM-RACK, CMGS, 4-SAS	.0027	.0940	.0036	1002.	.0000	.0000
ATM-SPAR CENTER	.0002	· 60 J 2	.0001	.0313	.012	0.
ATM-GRA/CAN CENTER	.0001	.6913	• 3000	.0015	.3024	.0040
SUM	. 1946	• 0932	•6228	.0239	.0591	.0065

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	.3702
6-FAS 02 TANKS	.3111
MDA/STS/AM	•1323
6-AM N2 TANKS	.3137
COMMAND/SERVICE MOD.	.1312
DEPLOYMENT ASSEMBLY	.0189
ATM-RACK, CMGS, 4-SAS	.0103
ATM-SPAR CENTER	.0630
ATM-GRAZCAN CENTER	.0093

ORIGINAL PAGE IS OF POOR QUALITY

SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM TABLE A-56

RUN NO. 545

FREQUENCY = 15.23

TEST MODE

23 A

NONE **640** GMC GMC GMC SMC GMC-NODE-NO. (DX) (DY) (97) (TX) (TY) (TZ)DESCRIPTION .0016 .0004 .0031 .0018 .0087 .0015 BASE RNG/DWS SKIRT 1 .0026 .0001 .0036 -.0001 .0027 .0901 OWS/IJ INTERFACE .3048 - . 9991 .0012 .3001 TU/FAS .0013 .3013 INTERFACE .0987 4 .0234 .0033 o. FAS 02 30711.+Y +Z 3. 0. .0902 .9076 ŋ. 0. FAS 02 BOTL 2,+Y +Z .0130 G. . 9493 ŋ. 9. ...0051 .015? 0. FAS 02 BOTL 3, -Y +Z 10500 .0252 FAS 02 .0121 0. 0. 30TL4,-Y 0. 47. Q .0550 0. .0123 .0254 C. 0. FAS 02 30TL5.-Y 3 -.0003 ·-.0 -12 .0172 5. 0. ŋ. F4S 02 90TL5,-Y -Z 10 . 0.001 .0010 .0037 0. ů. 0. FAS/AY/DA TF, +Y .0021 .0056 FAS/AM/DA IF. +Z 11 .0011 0. 0. 0 . 0. . 1007 12 .9001 .0064 9. J. FAS/AM/DA IF. -Y .0930 FAS/DA IF. -Y -Z 13 -.0001 .0068 J. ũ. 0. 14 0. .0011 .0008 .0344 G. 3. FAS/AY IF, -7 15 .0904 FAS/DA IF, .0000 .0002 J. 0. +Y -Z Э. ·0005 15 .0001 .000G .0102 .0900 .0001 AM TUNNEL/SHEAR WR .0013 .0065 .0002 .0006 .0253 .0001 AM TUNNELISTS IF 1 0 -.0001 MDA/STS INTERFACE .0003 -.0034 .0007 ·C191 .0003 13 .0003 .0017 .0536 .0017 .0130 -.0000 MDA CONEZCYL ITREC 56 . 1015 N2 TANK, +Y, LOWER .0001 .0500 0. 0. 0. 0. 21 .0000 .0021 .0304 0. O. N2 TANK, +Y, UPPER 22 .0002 .0000 .0085 N2 TANK, +Z, LOWER 0. 0. 0. 23 .0005 .0910 .0369 TANK, +Z, UPPER o. ა. Q. N2 24 .3307 .0049 .1248 0. 0. N2 TAVK -Z. LOWER 25 .0044 .0475 0. .0000 0. 0. N2 TANK, -7, UPPER 25 .0012 -.0002 .0324 CM. FWD BULKHEAD .0001 .0022 .0000 27 .0081 .0004 .0002 .0015 .0014 .0307 CM, AFT BULKHEAD 28 .0005 -.0000 -. 0000 SM, FWD BULKHEAD .0001 20033 .0003 .0013 .0000 29 .0003 .0015 .0460 -.0002 SM, AFT BULKHEAD ۲ ŋ .0003 .0096 .0001 3. 0. 0. FOMED D LATCH. DA 5. 0. 31 -.0002 - . 0024 .0005 LOWER +Y TRUNNION 0. 0. 33 .0985 -.0004 LOWER -Y TRUNNION .0000 0. 33 0. .0021 .0004 .0000 EREP PACKAGE C.G. U. 0. 74 .0002 .0003 .0009 0. 0. ATM PN 6.7 IF. DUTR 0. 7 = .0004 .0007 3. PY .0001 0. 0 . ATM 4,5 TF, OUTR 76 .0011 .0001 .0005 ATM PV 9. 0. 0. 3,1 TF, OUTR 77 .0013 PV -.0000 ATM .0002 0. O . 2,3 IF, OUTR 0. 7.0 .0000 .0010 .0005 0. ATM PV 9. 0. 5.7 IF, INNR 77 -.7901 .0003 .0003 0. 0. ATM PN 0. 4,5 IF. INNR 40 3,1 -. 0001 . 11104 .0002 0. 0. ATM P4 IF, INNR 0. .. 1111 0. 41 0. ATM PN 2.3 .0009 .00G1 IF, INNR 42 .0000 .0000 -.0300 .0002 .0001 .0000 CMG, -Y SING 43 .0000 .0000 .0000 .6000 CMG, +Y .0000 .0002 SIDE .0000 44 .0000 .0002 .0001 .0000 .0000 CMG, .+X SIDE 45 0. ATH SAS. .0001 .0001 0. 0. ⊃N ⊂ . 0 . ATM SAS, 45 0 . .0000 .0000 0. эN 0. 0. 47 ATM SAS, .0.000 .0000 0. ÞΝ 5 a D 0. 8. 4.9 . 1000 .0000 ŋ . 0. 0. ATM SAS, PN 7 .0002 SPAR CENTER 47 .0002 .0002 .0001 .0013 .0012 50 .0001 .0015 .0024 .0040 GRAZCAN GENTER .0013 . 0000

.0591

.0066

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SUM

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.522 A

.0239

TABLE A-57 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 24	TEST FREQUENCY = 16.53 HZ.					
C OMPONENT	GM C	GM C	GM C	GMC	GMC	GM C
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(12)
BRIONS SKIRT/IU/FAS	.0021	.0461	. 32 45	. <i>C</i> 377	3012	.6013
6-FAS 02 TANKS	.2163	.0512	. 3280	0.	u.	0.
MDA/STS/AM	.00 25	. 0757	.0015	.0006	.0005	.0090
5-AM N2 TANKS	.0028	. 3252	.0008	C.	С.	3 .
COMMAND/SERVICE MOD.	.0018	.3110	.0712	.0907	.9001	.0010
DEPLOYMENT ASSEMBLY	.0394	• 3556	. 9948	0.	0 •	0.
ATH-RACK, CMGS, 4-SAS	.0172	. 9234	.0177	.6001	.6900	.0001
ATM-SPAR CENTER	.0003	.0002	.0001	.0013	.0112	0 •
ATH-GRAZCAN CENTER	.0618	.6393	.0007	.0015	·C194	.0052
SIIM	2824	5888	.0792	.[119	. [21]	- 3166

BR/OWS SKIRT/IU/FAS	.0806
6-FAS 02 TANKS	.2954
MDA/STS/AM	.0898
6-AM N2 TANKS	• 328 8
COMMAND/SERVICE MOD.	.0149
DEPLOYMENT ASSEMBLY	• 0998
ATM-RACK, CMGS, 4-SAS	• 0585
ATM-SPAR CENTER	.0130
ATM-GRA/CAN CENTER	.0190

TABLE A-58 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST 400E 24A RUN NO. 638 FREQUENCY = 16.53

	430E	୬.୬.୬. ଜ ୯ ୁ	G,MC	GM.C.	· ·		G,M,C	
	٧٩.	(XG)	(DY)	(07)	(XX)	(TY)	· (TZ)	DESCRIPTION
		0.006	0004	0435	0005	0004		24.05 24.04.0 24.0
	1	•0005	.0001	•0135	.0000	0001	•0010	BASE RNG/OWS SKIRT
		.0001	.0110	.0019	.0043	• 3302	•0002	OWS/IJ INTERFACE
	3	•0009	.0119	.0012	.0035	0013	.0001	
	£,	• 0 2 0 8	•0095	.0070	0•	0.	0.	FAS 02 BOTL1,+Y +Z
	5 .	.0120	.0010	.0055	9 •	0.	ð.	FAS 02 30TL2,+Y +Z
	5	.0056	.0938	.0073	0.	0.	9 •	FAS 02 BOTL3,-Y +Z
	7	.0170	.0075	.0004	3.	0.	J.	FAS 02 BOTL4,-Y +Z
	я	.0917	.0183	. 0004	0.	Û.	0 •	FAS 02 BOTL5,-Y -Z
	` 9	.1591	.0201	.0072	0.	0.	3.	FAS 02 8016,-Y -Z
	10	0004	.0015	.0000	ĵ. ·		0.	FAS/AM/DA IF, +Y
	11	.0002	.0006	.0002	0.	0.	ĵ.	FAS/AM/DA IF, +Z
	12	. 6000	.0017	.0002	0.	0.	0.	FAS/AM/DA IF, -Y
	13	0000	.0174	.0074	J.	0.	0.	•
	14	0001						FAS/DA IF, -Y -Z
			.0918	0004	j.	0.	7.	FAS/AM IFZ
	15	.0100	.0001	0001	J.	0 •	0.	FAS/DA I*, +Y -Z
	15 ,	.003	.0361	• 0000	.0000	• 0'0 0 0	.0014	- - ,
•	17	•0002	.0270	0003	.0001	.0001	• 0 034	AM TUNNEL/STS IF
	18	•00009	.0788	.0002	.0005	.0003	.0018	
	19	• 0009	.0039	.0013	0000	0001	.0024	MDA CONE/CYL ITREC
	50	.0021	.0288	• 0 0 0 5	3 •	9.	0 •	N2 TANK, +Y, LOWER
•	21	.0995	·0737	.0000	3.	0.	0.	NZ TANK, +Y, UPPER
	50	.3001	.0155	.0001	9.	0.	0.	N2 TANK, +Z, LOWER
:	23	. იათი	.0514	.0003	9.	Ü.	9.	112 TANK, +Z, UPPER
	24	.0000	.0143	- • 0001	0.	3.	0 •	N2 TANK -Z, LOWER
	25	• 1000	.1415	.0001	3.	0 •		'N2 TANK, -Z, UPPER
	25	.0000	.0032	.0009	.0003	.0000		CM, FAD BULKHEAD
	27	.0000	.0059	.0001	. 20.03	.0000	.0005	
	? 3	. 0 3 3 5	.0001	.0000	.0000	0000	•0001.	
	?a	.0005	.0018	.0001	.0001	.0000	.0000	SM, AFT BULKHEAD
	30	.0080	.0523	.0009	0.	0.	0.	LOWER D LATCH, DA
	31	.0173	0015	.0051	0.	0.	0.	LOWER +Y TRUNNION
	32	.0138	0052	0012	0.	0.	0.	LOWER -Y TRUNNION
	33	.0023	.0000	0000	0.	0.	0.	EREP PACKAGE C.G.
	34	.0119	0001	.0021	3.	0.	0.	
	3 %	.0062	.0001	.0021			0	
	3.6	.0005	.0007	.0043		0.		ATM PN 4,5 IF, OUTR
	7 7	.0041) •	0.	0 •	ATM PN 8,1 IF, OUTR
•	7 A	.0002	.0033	.0002	0.	0.	0.	ATM PN 2,3 IF, OUTR
	- (<u>4</u> .0)		.0121	.0007	0.	0.	0.	ATM PN 5,7 IE, INNR
	40	.0030	.0031	.0017	0.	0.	0 .	ATM PN 4,5 IF, INNR
		.3002	.0003	.0022	9.	0 •	0 •	ATM PN 8,1 IF, INNR
	41	0002	.0018	• 0001	0.	0.	0.	ATM PN 2,3 TF, INNR
	42	.0008	.0009	.0009	.0000	• 0000	0000	CMG, -Y SIDE
	43	.0002	.0007	.0008	.0001	3000	.0000	CMG, +Y SIDE
	44	.0000	.0002	.0002	• 0000	•0000	.0001	CMG, +X SIDE
	45	.0001	.0001	0.	0•	0 •	0.	ATM. SAS, PN 1
	46	.0000	.0000	0.	0.	0.	0 🏚	ATM SAS, PN 3
	47	.0001	.0001	0.	0.	0 •	0 •	ATM SAS, PN 5
	48	.0002	.0002	0.	0•	G •	0.	ATM SAS, PN 7
	. 49	.0003	.0002	.0001	.0013	.0112		SPAR CENTER
	₽Û	.0010	.0003	.0007	.0015	.0104	.0052	GRAZDAN CENTER
	SUM	. 2824	• 5888	.0792	.0119	.0210	.0169	9

TABLE A-59 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 25	A	TEST FREQUENCY = 17.01 HZ.					
COMPONENT	GM C	GM C	GM C	GMC	GMC	GMC	
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	
BR/OWS SKIRT/IU/FAS	.0171	. 20 07	.0411	.6326	0005	.0044	
6-FAS 02 TANKS	. 2948	. 2227	•0292	0.	0.	0.	
MDA/STS/AM	. 3382	.0072	.0037	2000 ·	0003	.0005	
5-AM N2 TANKS	.0768	.0154	.0178	C .	C •	0.	
COMMAND/SERVICE MOD.	. 09 37	.3078	.0019	.6396	.0034	. 6994	
DEPLOYMENT ASSEMBLY	00 38	. 30 24	.0009	0.	0.	0.	
ATH-RACK, CHGS, 4-SAS	. 00 11	. 30 34	.0005	.0000	.0000	.0000	
ATM-SPAR CENTER	.0061	. 3001	.0001	.0302	.0009	9.	
ATH-GRAZCAN CENTER	.0000	. 2002	• 90 00	.6003	.0308	.0004	
SUM	.8257	. 0568	.1952	.0332	.0044	.0148	

BR/OWS SKIRT/IU/FAS	.0648
6-FAS 02 TANKS	.3467
MDA/STS/AM	.3493
6-AM'N2 TANKS	.1101
COMMAND/SERVICE MOD.	.1169
DEPLOYMENT ASSEMBLY	.0071
ATM-RACK, CMGS, 4-SAS	.0(19
ATM-SPAR CENTER	.0013
ATM-GRAZCAN CENTER	.0018

TABLE A-60 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOA

	TEST	AUUE	25 A	PUN NO.	499	FREQUEN	CY = 1,7_•.01
	,z======		;		-		
,							
がひひこ	540	GMC	GMC		GMO		
MO.	('X 'C')	(AA)	(n <u>?</u>)	(TY)	(TY)	(TZ)	DESCRIPTION
<u>.</u>	0.176	0000	0470	2045	0001	.0000	BASE RNG/DWS SKIRT
1. 2	•0175 •0028	.0700 .0001	.0178 .0051	.0515 .0002			OWS/IU INTERFACE
: 3	• 0027 • 0053	. 9094	.0113	.0002			TU/FAS INTERFACE
4	.1430	0122	.0082	J.	9.		FAS 02 BOTL1,+Y +Z
-	0532	0135	.0080	j.	0.		FAS 02 30TL 2,+Y +Z
5	.0113	.0012	.0007	0 •	0.		FAS 02 BOTL3,-Y +Z
÷	.0429	.0003	.0021	Ű•	0.		FAS 02 BOTL4,-Y +Z
9	. 0455	.0141	.0078	3.	0.		FAS 02 BOTL5,-Y -Z
à	0910	.0014	.0024	0.	J •	0.	FAS 02 BOTLS,-Y -Z
1 7	.0000	0002	.0003	o •	0 •	0.	FAS/AM/DA IF, +Y
11	1102	.0000	.0043	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0000	.0006	0000	3.	0.	9.	FAS/AM/DA IF, -Y
13	.0002	0005	.0012	g.	0.	J •	FAS/DA IF, -Y -Z
14	• 0003	.0001	.0010	0 •	0 •	0 •	FAS/AM IF, -Z
1 7	.0002	.0001	.0001	J •	0.		FAS/DA IF, +Y -Z
15	.0319	4.0033	.0009				AM TUNNELISHEAR WB
17	. 9744	.0015				• O C 04	
1 8	. 1 747	0001		•0000	0002		
17	.1002	.0024		• 9000	0002		=
2,0	.0185	.0003	.0051	Û•	9.	3.	N2 TANK, +Y, LOHER
21	•0073	.0010	.0020	0 •	0.		N2 TANK, +Y, UPPER
3.5	• 9 9 9	.0001	.0012	0 •	3.	0.	N2 TANK, +Z, LOWER
23	.0151	.0056	.0065	,0•	0.	0.	N2 TANK, +Z, UPPER
24	0145	.0004	.0017	0 .	0.	J •	N2 TANK -Z, LOWER
25	.0116	.0081	.0012	ŋ.	0.	0.	N2 TANK, -Z, UPPER
25 25	• 3972	.0025	.0000				CM, FWD BULKHEAD
? 7	.0089	- 0000		.3001	.0015		
28 23	.0193	.0044 .0008	.0001 .0018	.0004 .0001	.0000 .0003		
30	.0532	.0006	0003	9.	3.	0.0039	LOWER O LATCH, DA
30 31	• 0003	.0005	0001	0.	g	8.	LOWER +Y TRUNNION
32	.9001	.0013	•0012	δ.	0.	0.	LOWER -Y TRUNNION
7 7	.0002	.0010	.0000	3.	0.	3.	EREP PACKAGE D.G.
74	.0301	.0000			0.	0.	ATM PN 5,7 IF, OUTR
*5	.0004	0000	.0000	j.	0.	9.	ATM PN 4,5 IF, OUTR
76	.0003	.0000	.0001	0.	0.	3.	ATM PN 8,1 IF, OUTR
77	.0001	.0001	.0000	9.	Ü•	0 .	ATM PN 2,3 IF, OUTR
38	.0000	.0001	.0000	j.	9.	0.	ATM PN 5,7 IF, INNR
χg	. 2001	.0331	.0000	0.	0.	0 •	ATM PN 4,5 TF, INNR
40	0000	.0000	.0001	0.	9 •	0.	ATM PV 8,1 IF, INNR
41	.0000	.0080	.0003	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0100	.0080	.0000	.0000	.0000	.0000	CMG, -Y SIDE
43	•9999	.0000	.0000	.0000	.0300	.0000	CMG, +Y SIME
44	.0003	.0000	. 3003	.0000	0000	.0000	CMG, +X SIDE
4 =	• ១០១០	.0000	0.	9 •	0 •	3.	ATM SAS, PN 1
45	0000	0000	0.	0 •	G •	0.	ATM SAS, PN 3
47	. 0000	.0000	0 •	0 •	0 •	0 •	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0 •	ATM SAS, PN 7
49	.0001	.0001	.0001	.0002	.0009		SPAR CENTER
5 O	• nnap	.0002	.0000	.0003	.0008	.0004	GRAZCAN CENTER
SUM	. 8 25 7	.9568	• 0 95 2	•0032	.0044	014	g

SECTION B

Two-Dimensional Plots of Test Modes

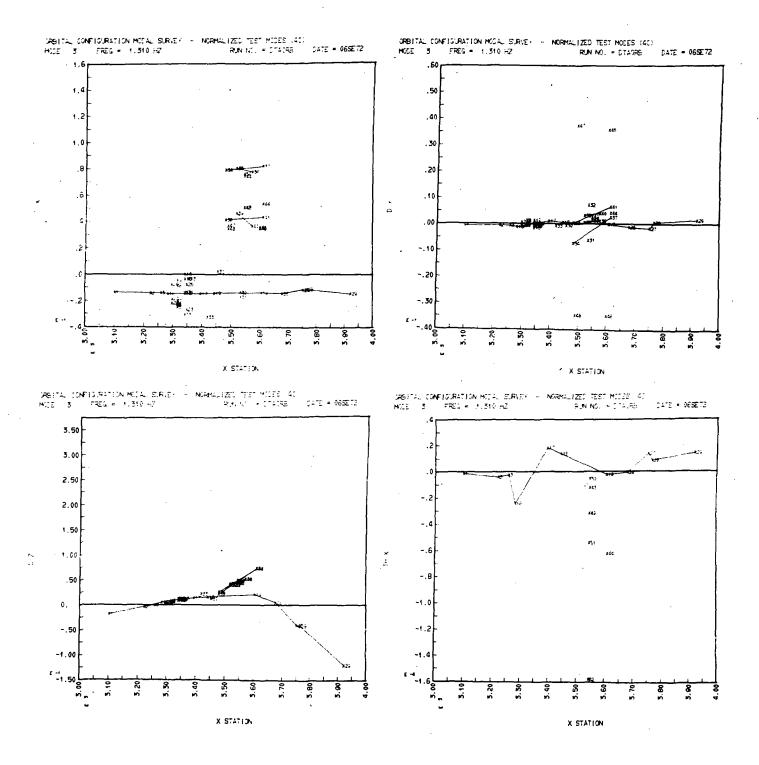
ORBITAL CONFIGURATION MODAL SURVEY DEGREE OF FREEDOM TABLE FOR MODE SHAPES AND DISCRETE MASS MATRIX

NOD	=	DECO	EES OF	FPF	EDOM			LOCATION		
NO)Y	37	TX	TY	TZ	x	Y	Z	JESCRIPTION
1		2	3	` <u> </u>	5	Έ	3100.00	0.000	-	BASE RNG/OWS SKIRT
2		. 8	9	10	11	12	3223.000	0.000		OWS/IU INTERFACE
3	13	14	15	15	17	18	3258.555	0.001		IU/FAS INTERFACE
4		20	21	10	• '	₽.0	3316.555	81.473		FAS 02 BOTL1,+Y +Z
Ę,	22	23	24				3316.555	46.683		FAS 02 BOTL 2, +Y +Z
5	25	26	27				3316.555			FAS 02 BOTL 3, -Y +Z
7		29	30				3316.555			FAS 02 BOTL4,-Y +Z
8		32	33				3316.555	-81.473		FAS 02 BOTL5,-Y -Z
9	_	35	36				3316.555	-46.683		FAS 02 BOTL6,-Y -Z
10		38	39				3341.615	116.067		FAS/AN/DA IF. +Y
11	48	41	42				3341.615	0.000		FAS/AM/DA IF, +Z
12	_	44	45		*		3341.615			FAS/AM/DA IF, -Y
13		47	4.8				3355.700	-82.345	-81.488	FAS/OA IF, -Y -Z
14		50	51				3341.615			FAS/AM IF, -Z
15		53	54				3341.615			FAS/JA IF, +Y -Z
16		56	57	58	5.9	60	3282.365	0.000		AH TUNNEL/SHEAR MB
17		62	63	64	65	66	3394.615	0.003		AM TUNNEL /STS IF
18	67	68	69	70	71	72	3441.765			MDA/STS INTERFACE
19	73	74	75	76	77	7.8	3605.000	0.000		MDA CONE/CYL ITRFC
20	73	8 0.	81				3297.665		0.000	N2 TANK, +Y, LOWER
21	82	83	84				3348.365	69.05) 69.05)	0.000	N2 TANK, +Y, UPPER
. 22	95	86	87				3297.665	0.003	69 .050	N2 TANK, +Z, LOWER
23	8.8	89	90		*		3348.365	0.003	69.050	N2 TANK, +Z, UPPER
24	31	92	93				3297.665	0.003	-69.050	
25	94	9 <u>=</u>	96				3348.365	0.001	-69.050	N2 TANK, -Z, UPPER
26		9.8	99	100	101	102	3678.000	0.007	$0 \cdot 0 0 0$	CM, FHD BULKHEAD
	1.03	104	1 05	105	107	108	3751.600		- 0.000	CM, AFT BULKHEAD
	109	110	111	112	113	114	3766.500	0.003	0.000	SM, FHO BULKHEAD
	115	116	117	118	119	120	3921.500	0.003		SII, AFT BULKHEAD
	121	122	123				345 4.765	0.000		LOWER D LATCH, DA
	124	125	126			•	3532.915	113.500		LOWER +Y TRUNNION
	127	128	129					-113.503		LOWER -Y TRUNNION
	130	131	1 32				341 8 . 7 6 5	0.000		EREP PACKAGE C.G.
	133	134	135				3479.094			ATM PN 6,7 IF, OUTR
	136	137	138				3517.701			ATH PN 4,5 IF, OUTR
	139	140	141	/			3572.299			ATM PN 8,1 IF, OUTR
	142	143	144 /	•			3610.906			ATH PN 2,3 IF, OUTR
	145	146	147				3479.094			ATM PN 6,7 IF, INNR
	148	149	150				3517.701			ATH PN 4,5 IF, INNR
	151	152 155	153 156				3572.299 3610.906			ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
	157	158	159	150	161	162	3545.000			CMG, -Y SIDE
	163	164	165	156	161 167		3545.000		-181.995	CMG, +Y SIDE
	169	170	171	172	173	174	3610.906		-182.000	CMG, +X SIDE
	175	176	T 1 d	116	113	K 1 4	3599.930		-207.490	ATM SAS ,PN 1
	177	178						1 -54. 9301		ATM SAS, PN 3
	179	180						9 -54. 9301		ATH SAS, PN 5
	181	182					3490.0699		-207.490	ATH SAS, PN 7
	183	184	185	186	187		3545.000			SPAR CENTER
	188	189	190	191	192	193	3545.000			GRA/CAN CENTER
										· - ·

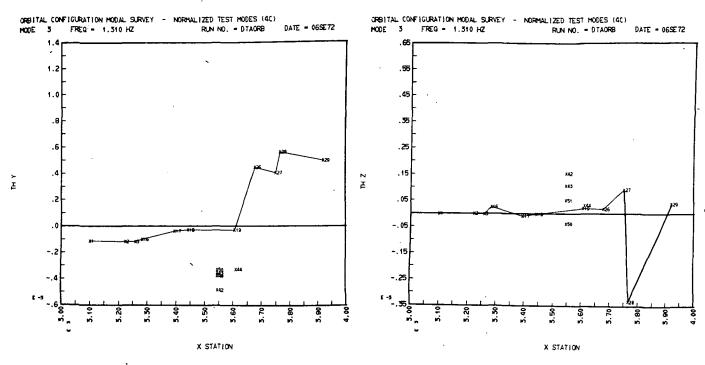
Two dimensional plots of each of the thirth test modes are presented in this section. The data plotted is the translated test quadratures normalized to the 193 x 193 discrete mass matrix. A least squares transformation from all ATM degrees of freedom at nodes 34 through 41 was used to define the three ATM center of gravity rotations given by Node 51. All of the resulting node points included in the plotted data are defined in the degree of freedom table presented on page B-2 of this section.

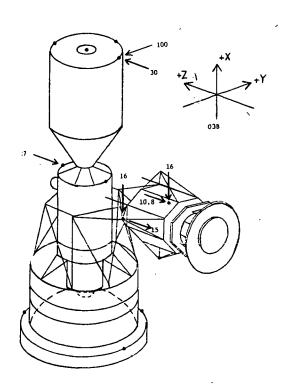
All nodes are plotted versus x station. In the plotted data the ATM is represented by two intersecting lines in each of the planes at the inner and outer ATM Z stations. At the outer ATM Z station the plane is defined by the intersection lines from node 34 to node 37 and from node 35 to node 36. At the inner ATM Z station the plane is defined by the intersection of lines from node 38 to node 41 and from node 39 to node 40. The line connecting node 3 to node 16 is a plotting error and should be ignored.

Plot B-I

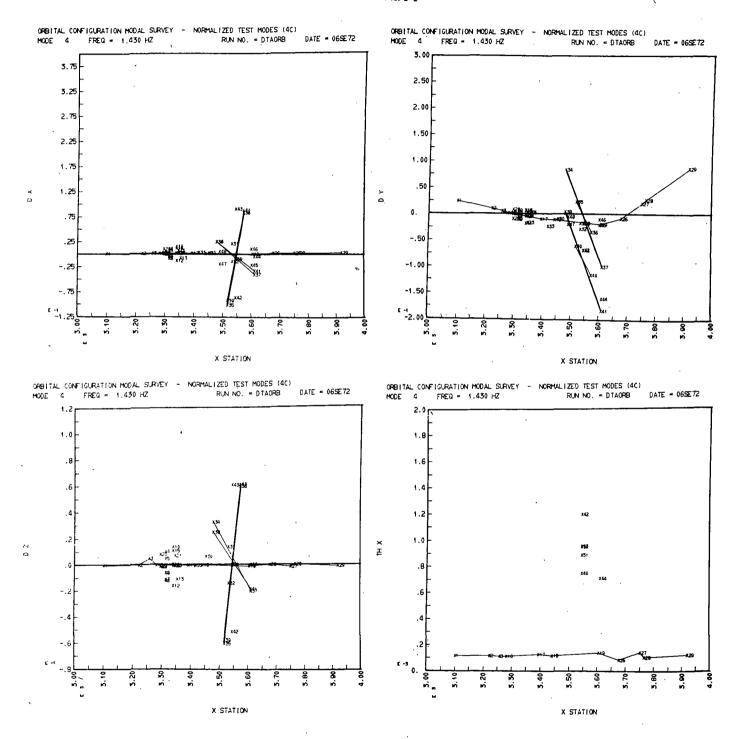




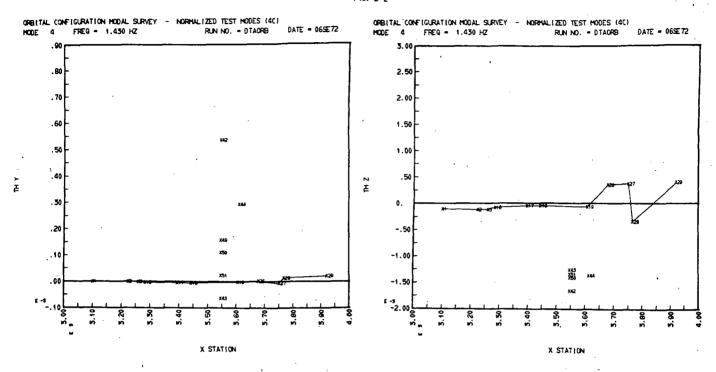


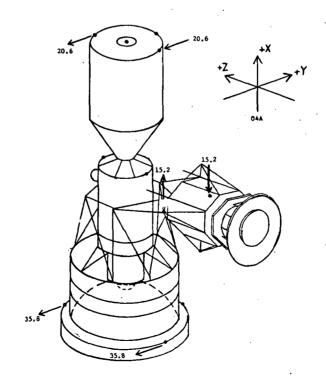


Plot B-2

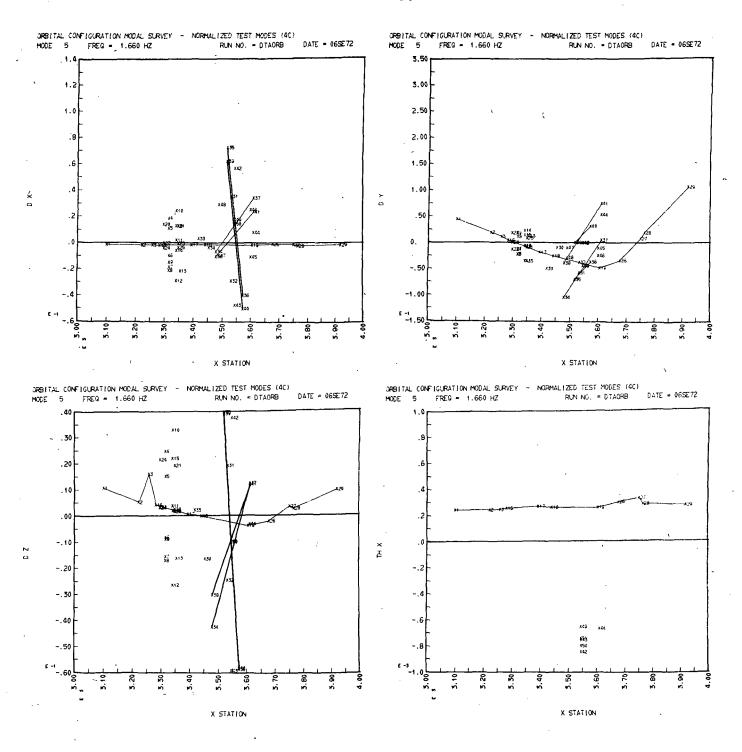


Plot B-2

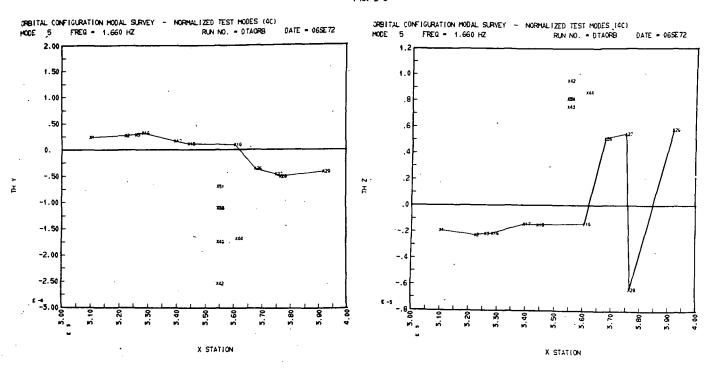


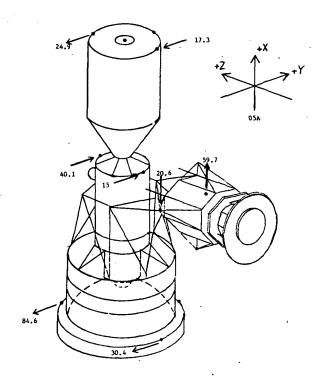


Plot B-3

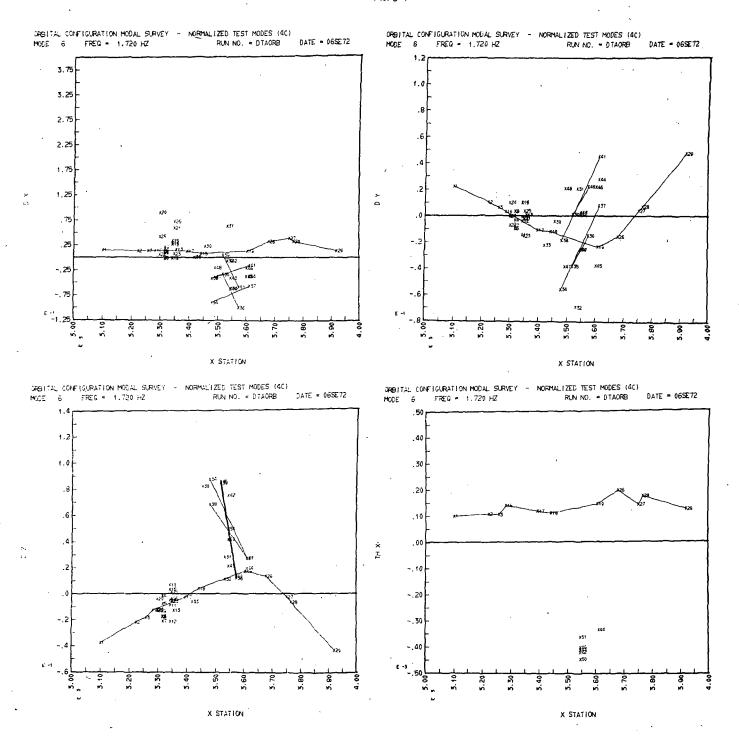


Plot B-3

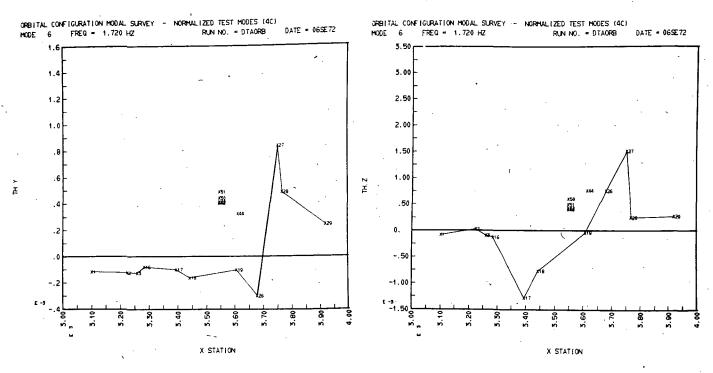


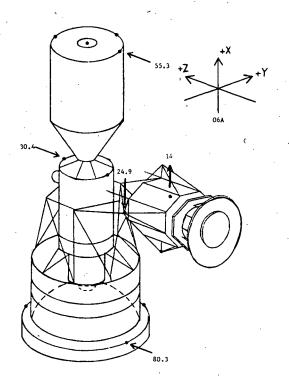


Plot B-4

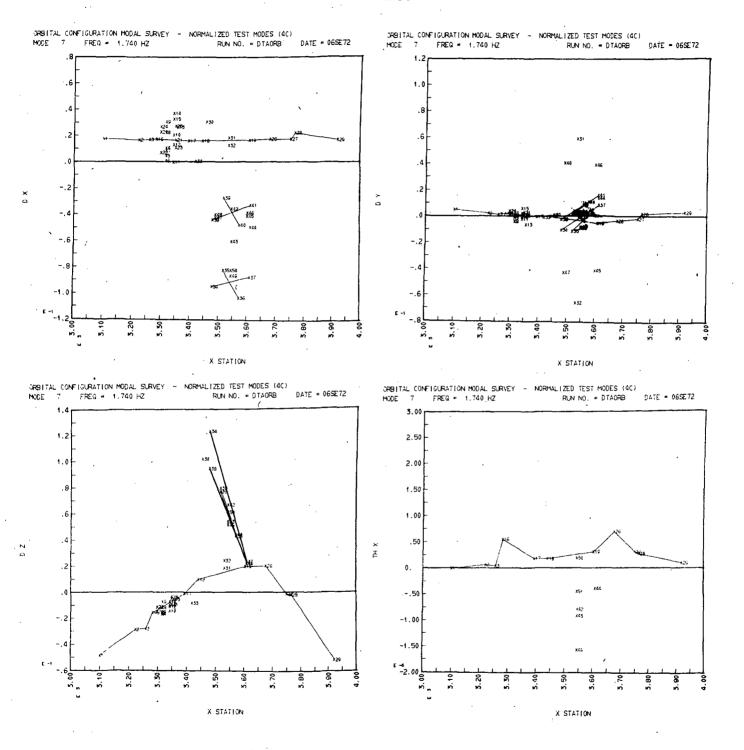




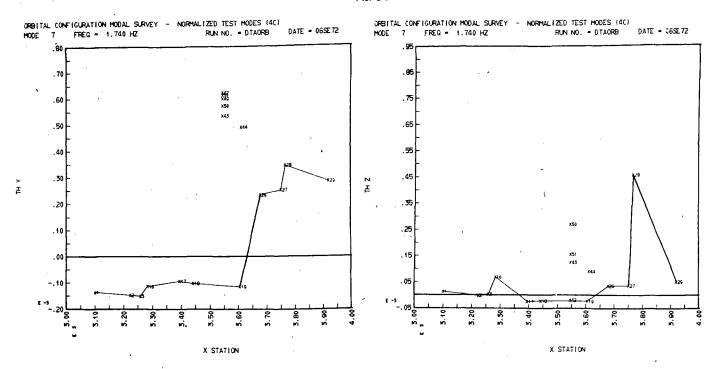


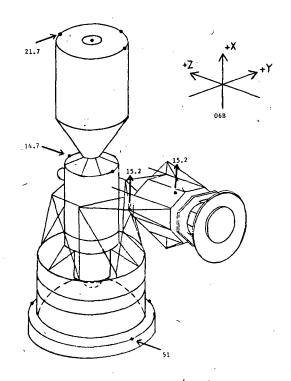


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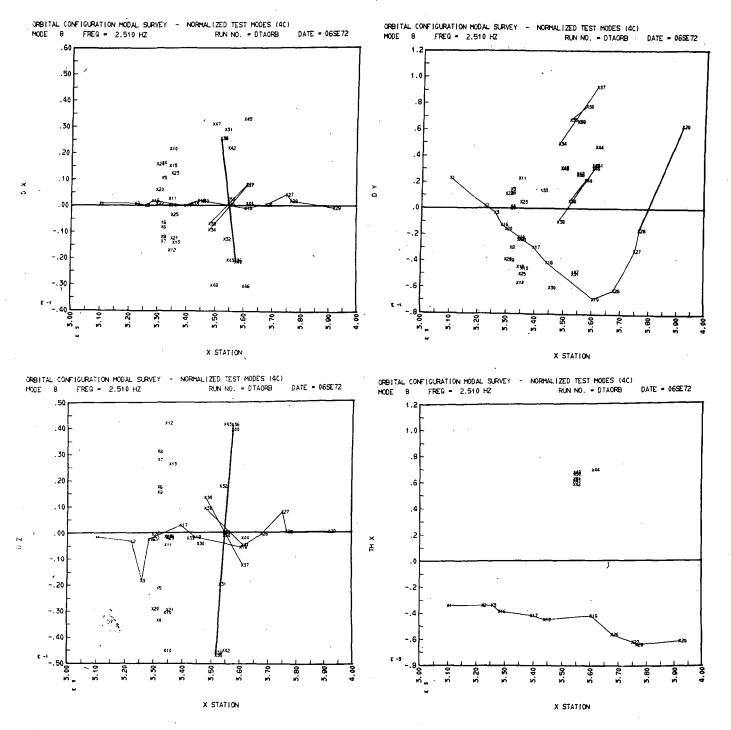


Plot B-5



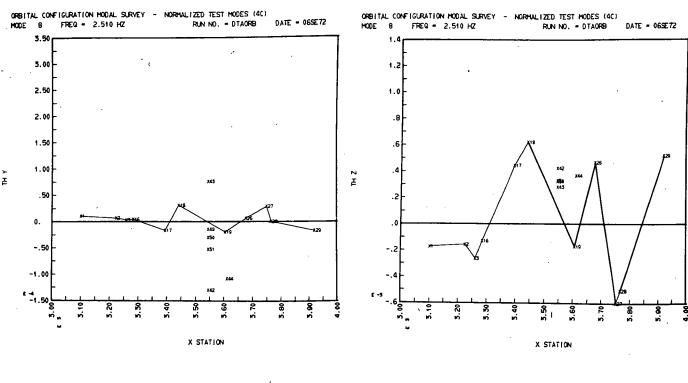


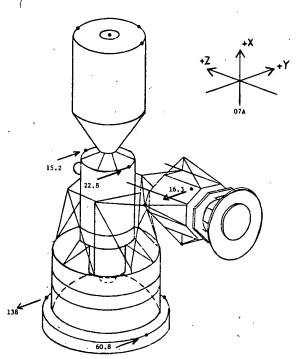
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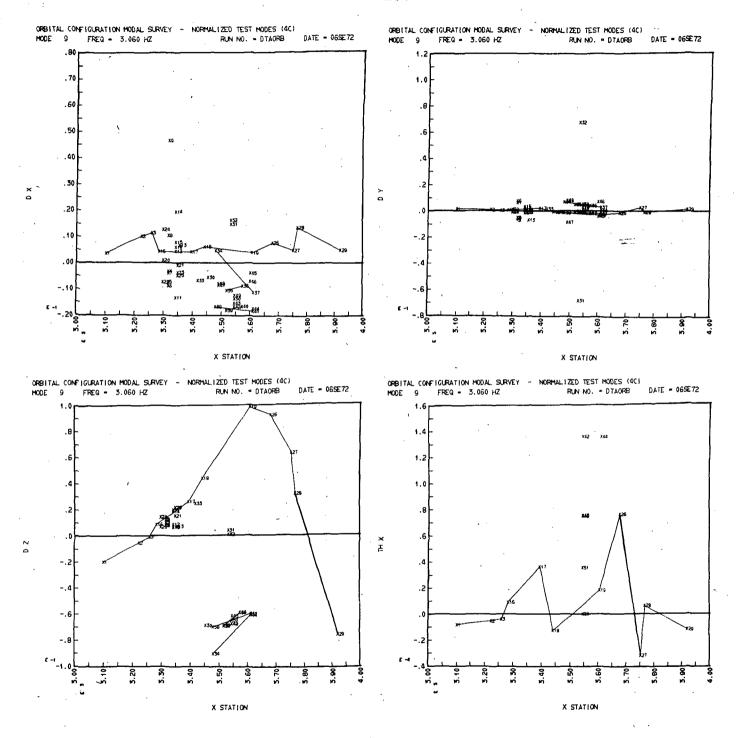
Plot B-6



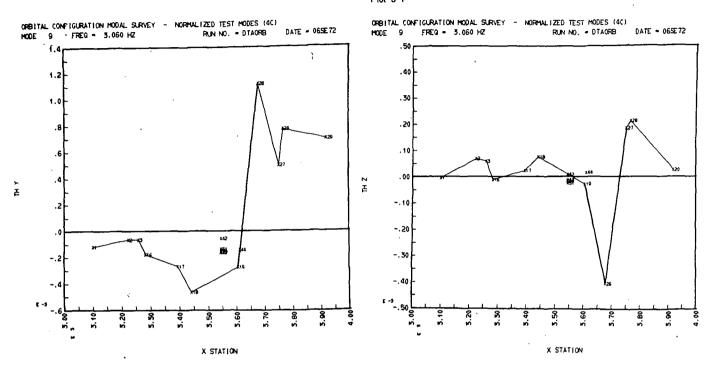


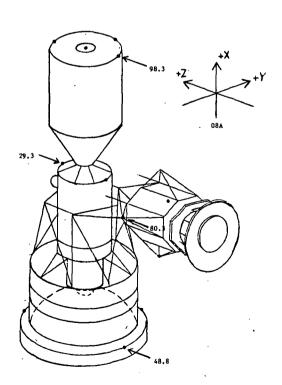
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Plot B-7



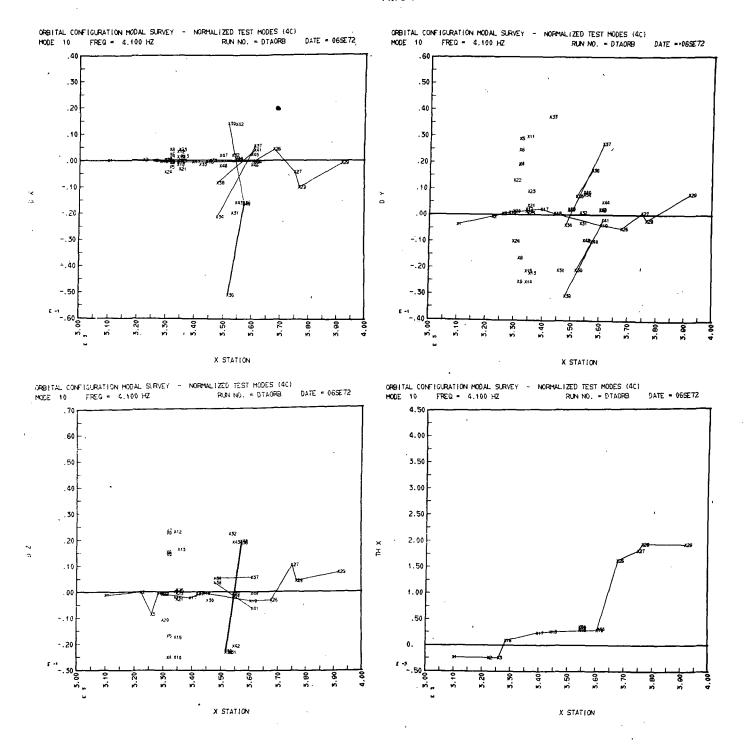
Plot B-7



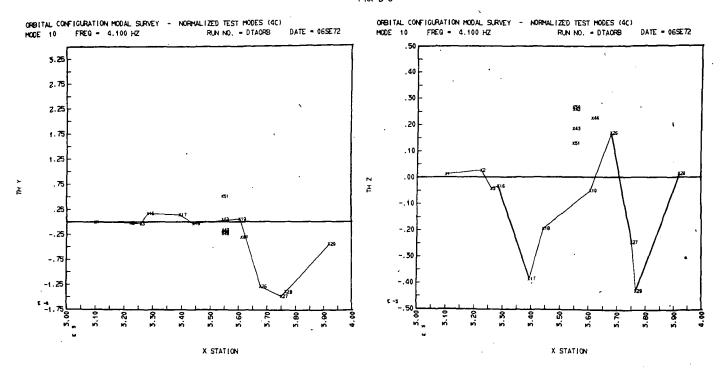


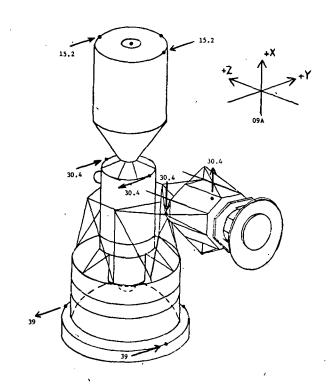
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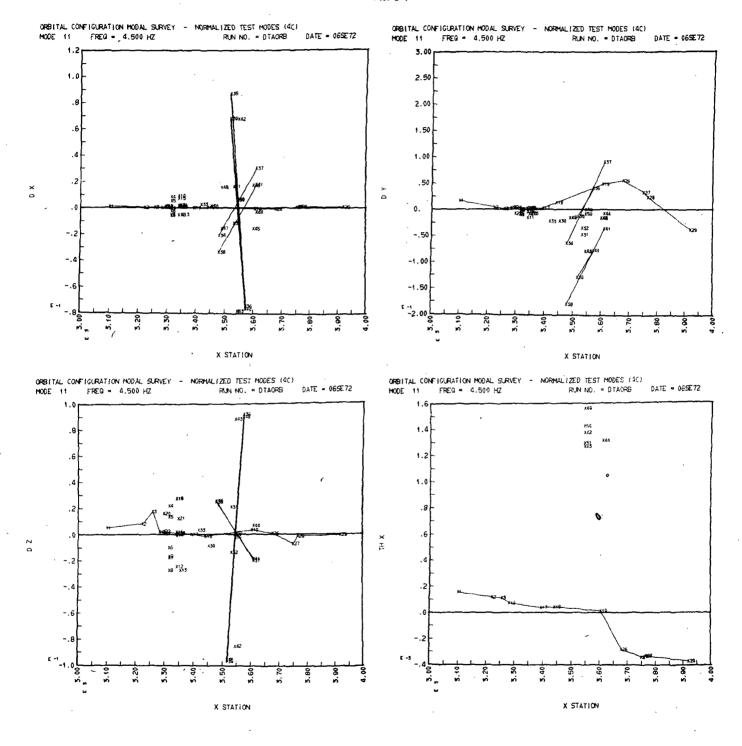


Plot B-8



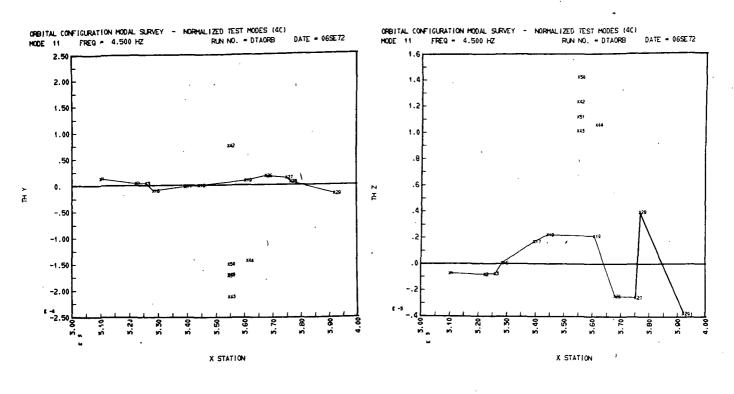


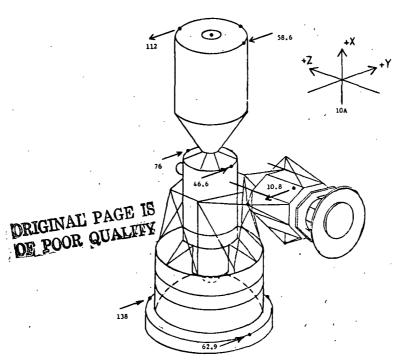
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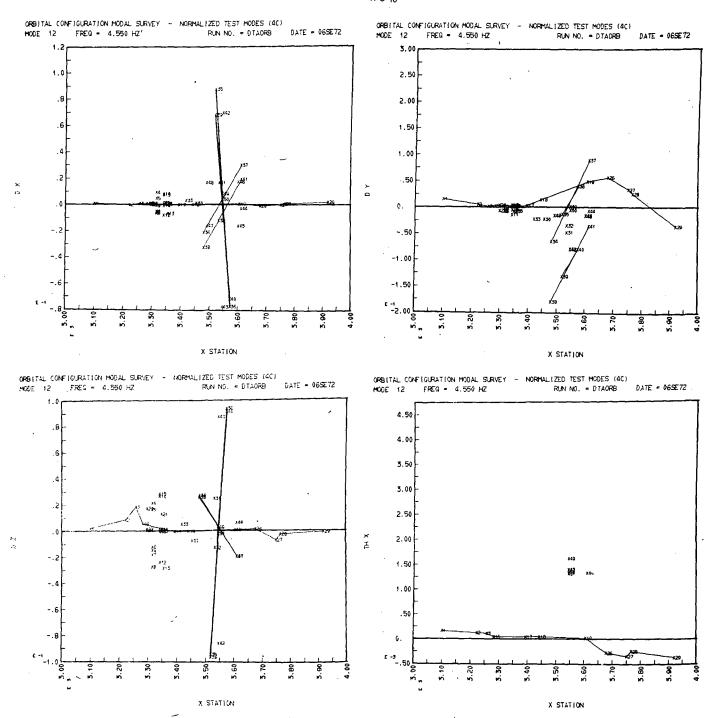
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Plot B-9

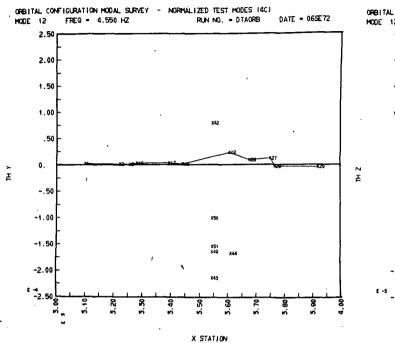


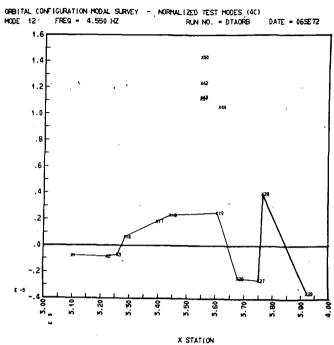


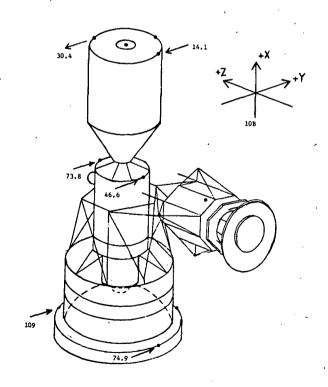
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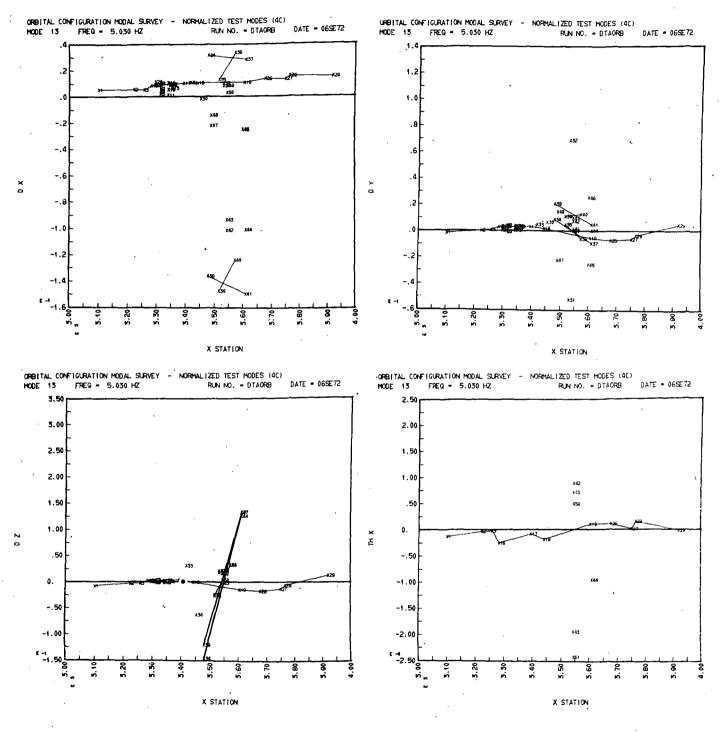
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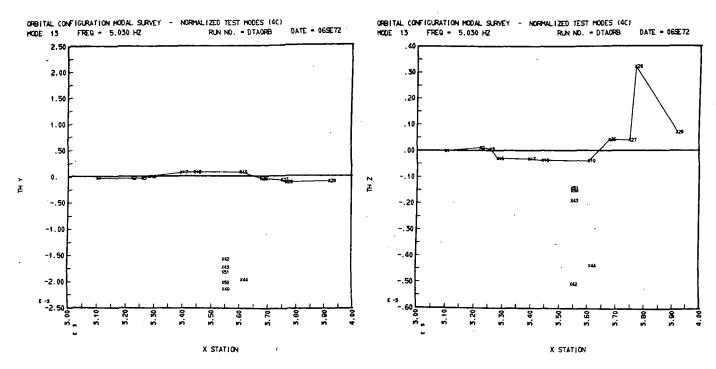


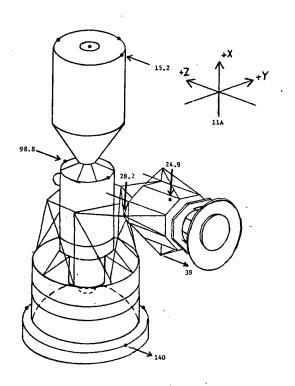


Plot B-II

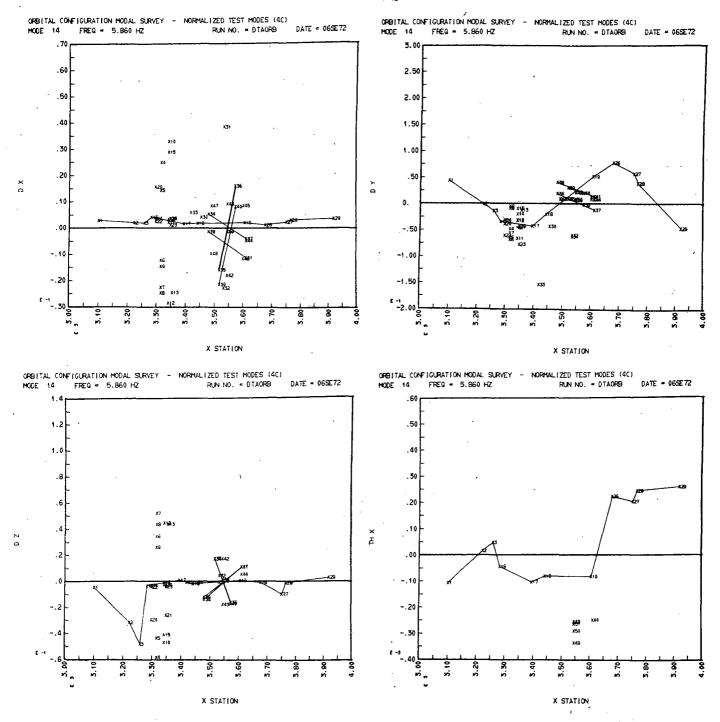


Plot 8-11

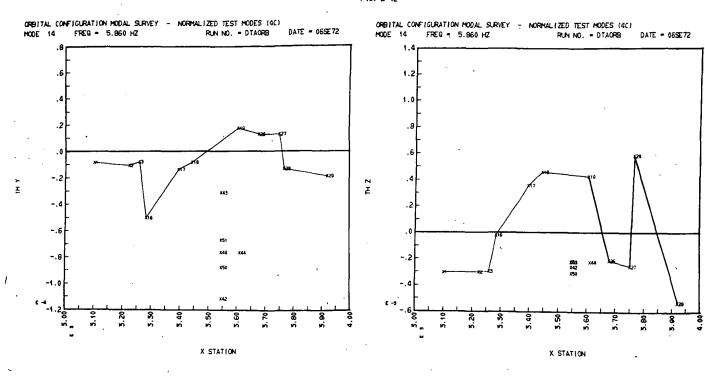


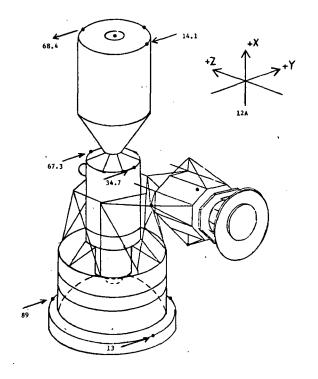


Plot B-I2

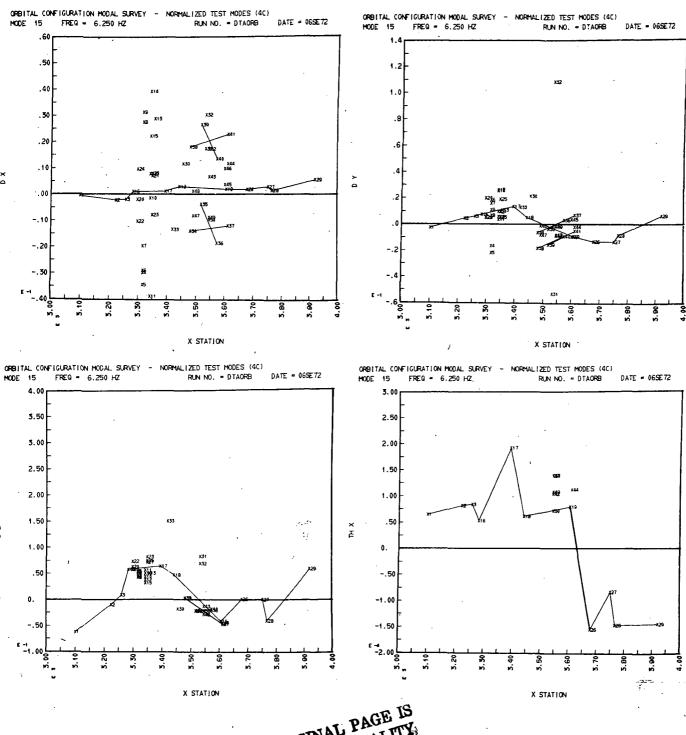


Plot B-I2



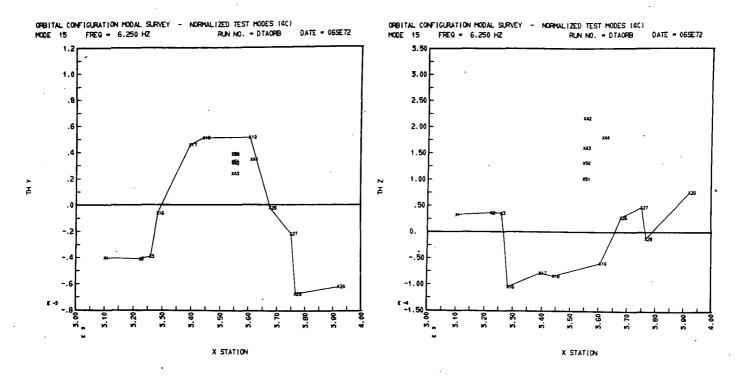


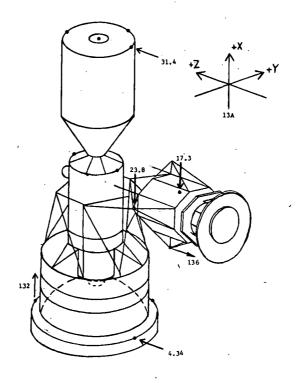
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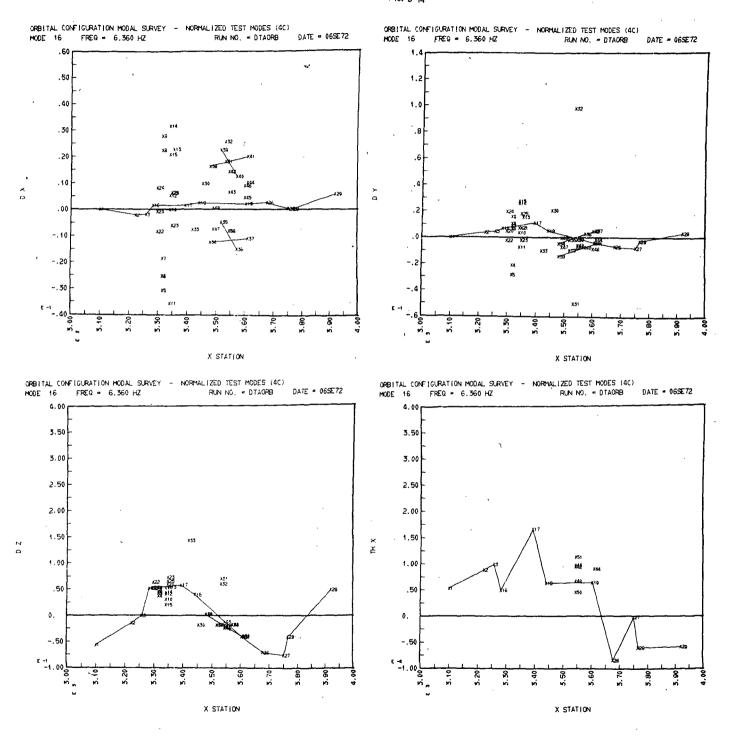
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Plot B-13

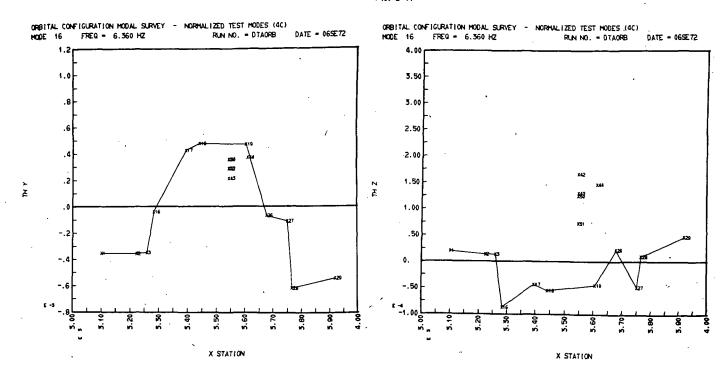


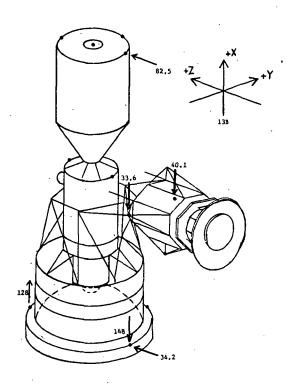


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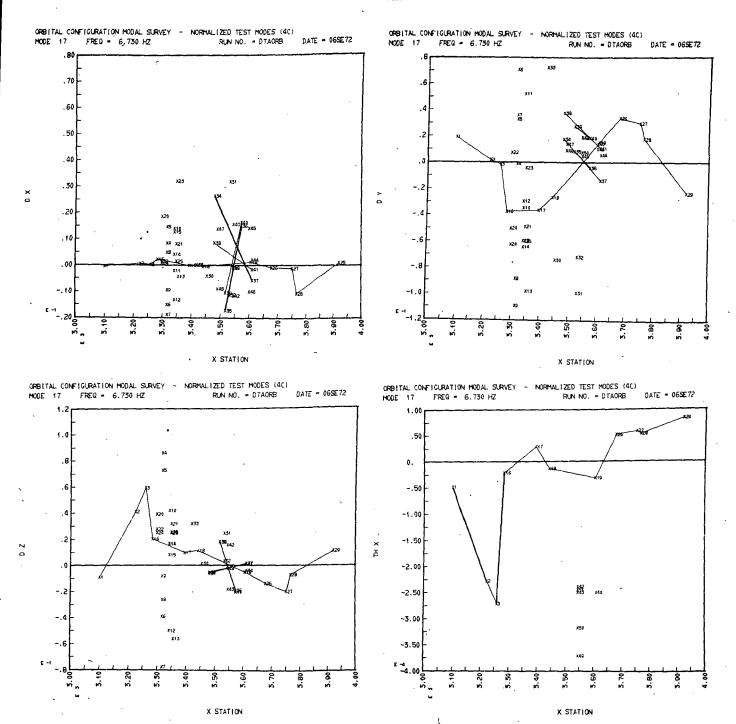




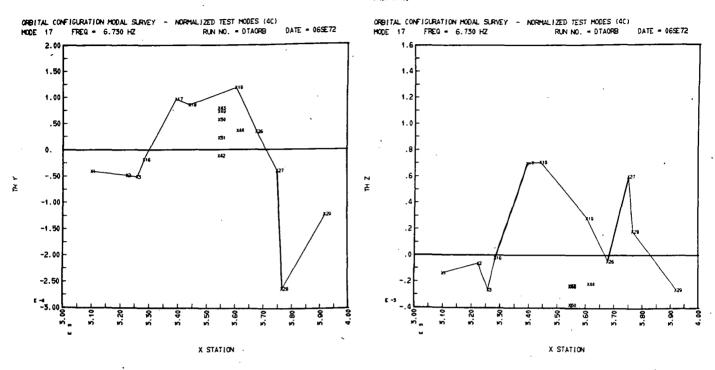


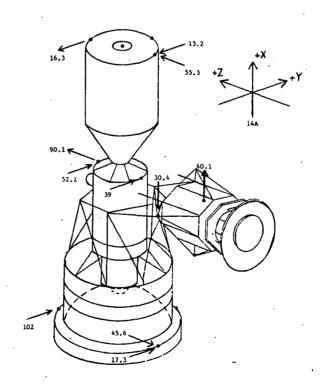


Plot B-15

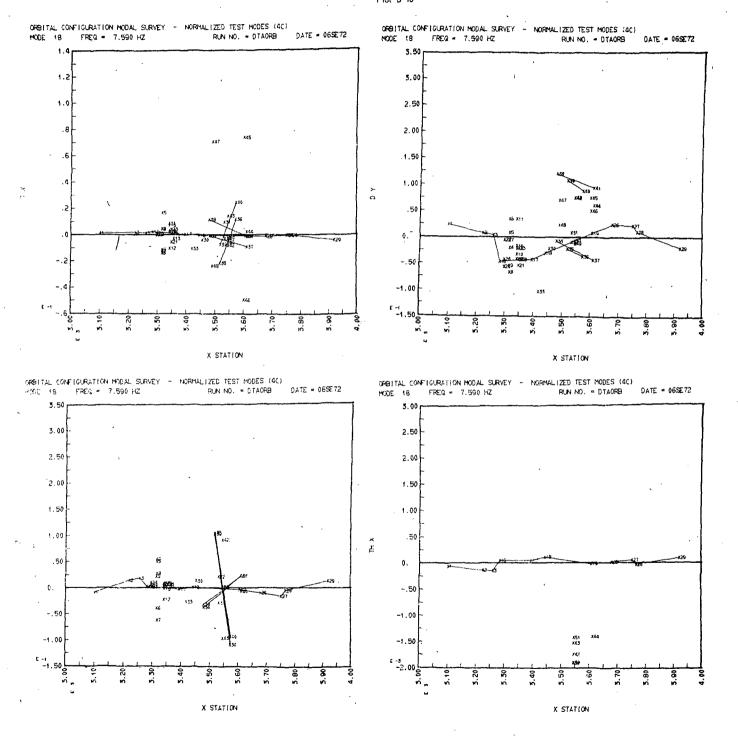




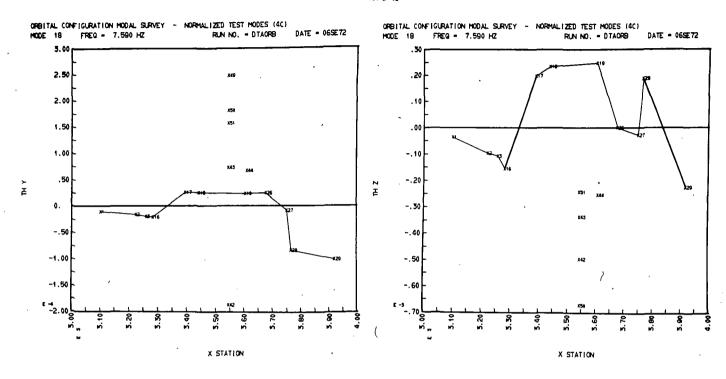


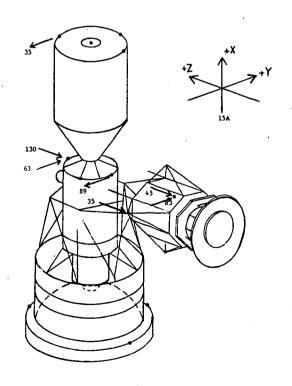


Plot B-16

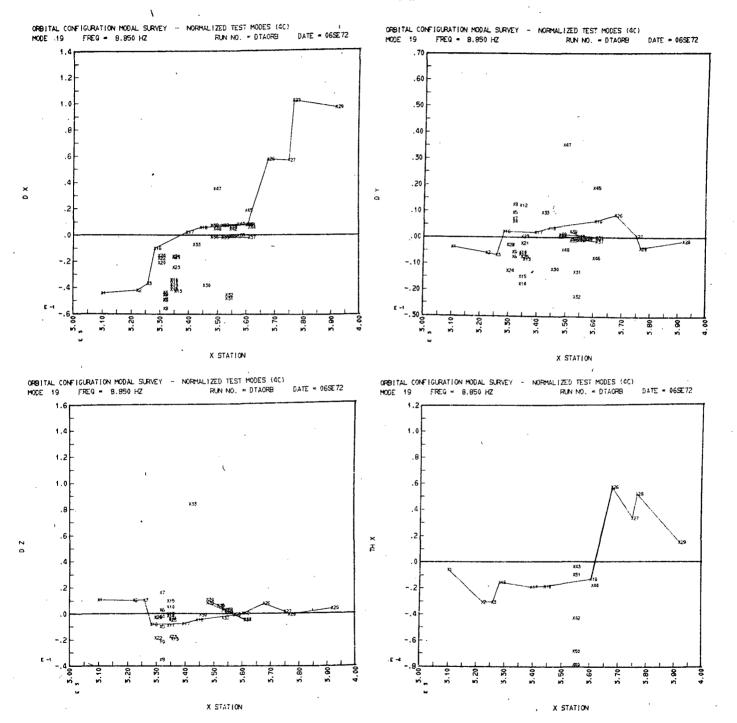


Plot B-I6

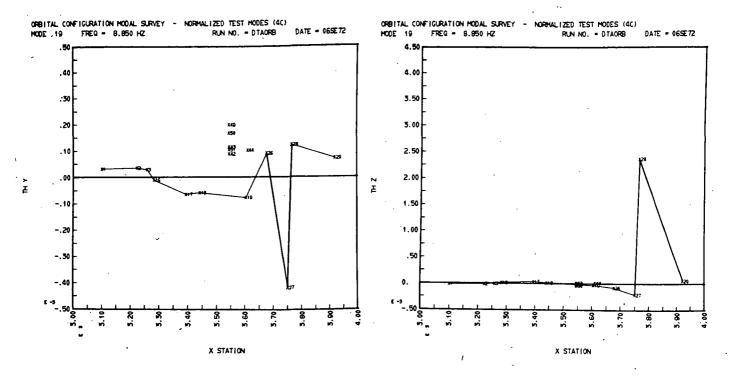


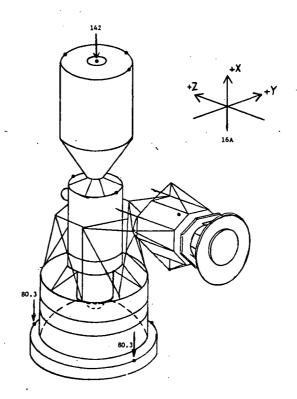


Plot B-17

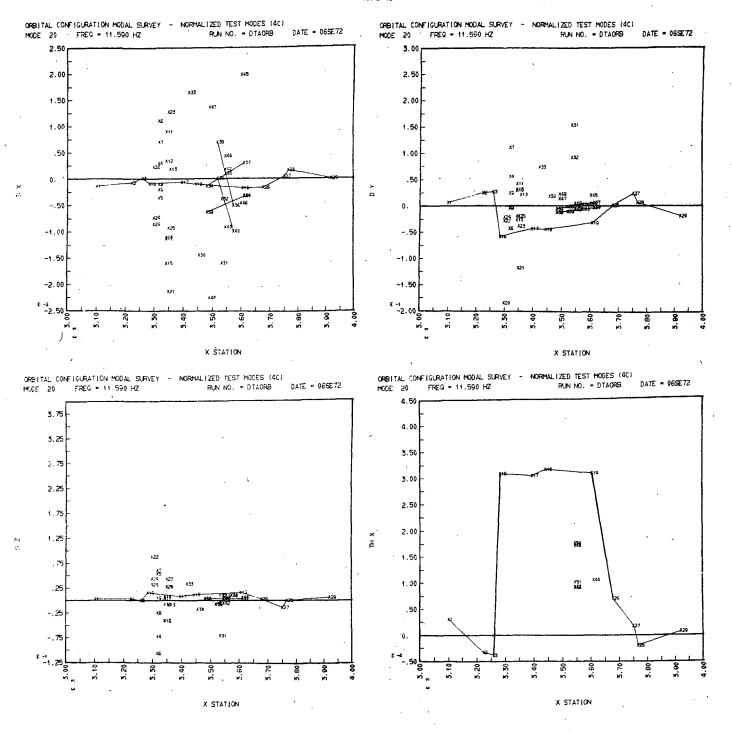


Plot B-17



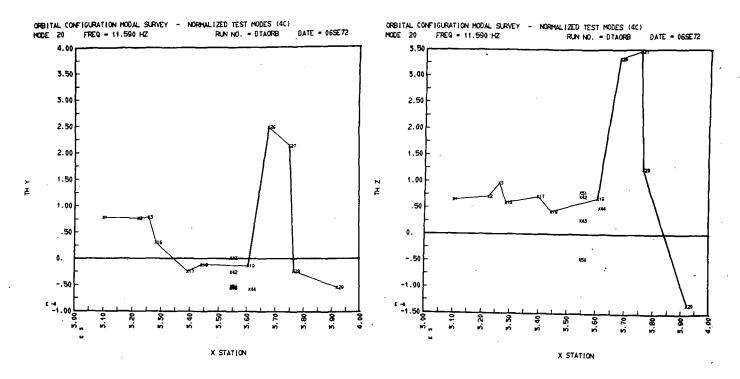


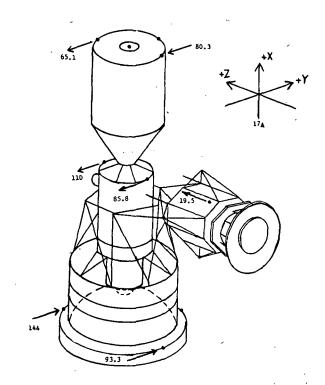
Plot B-18



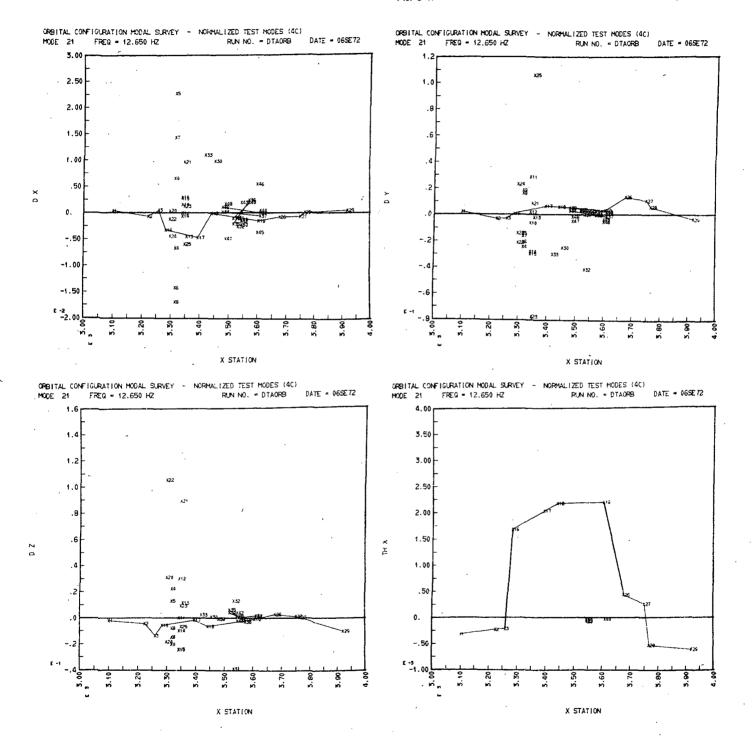
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Plot B-18

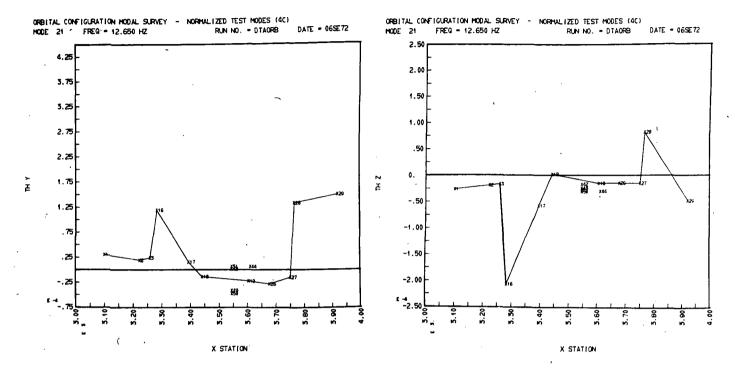


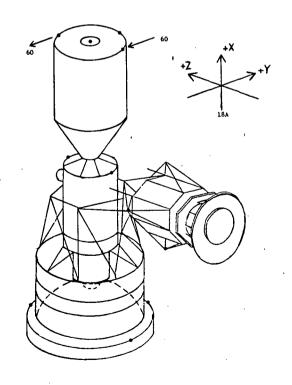


Plot B-19

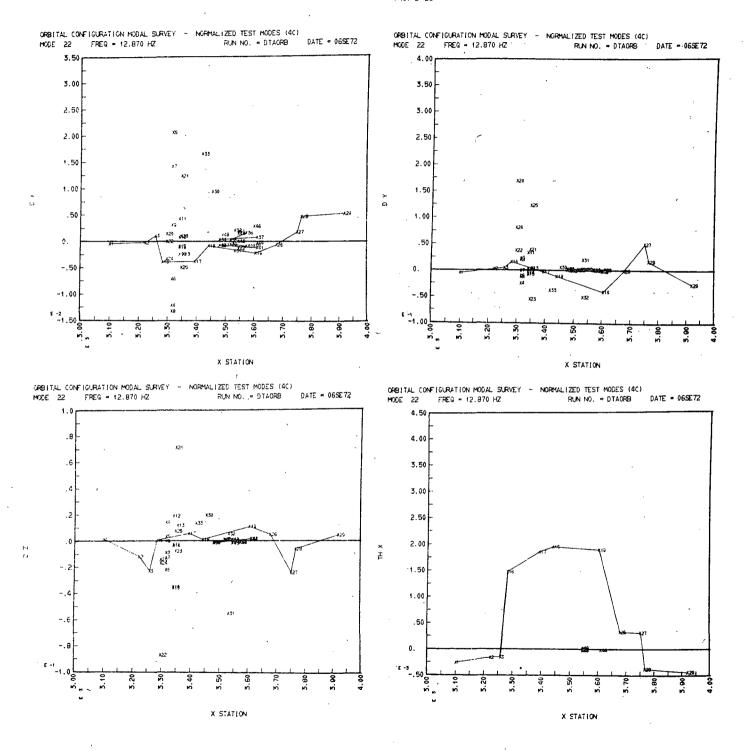


Plot B-19

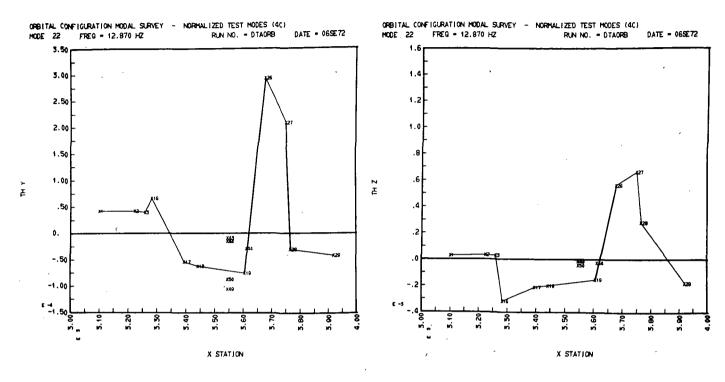


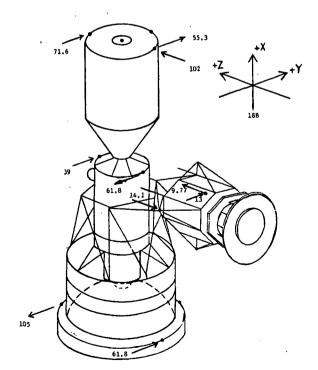


Plot B-20

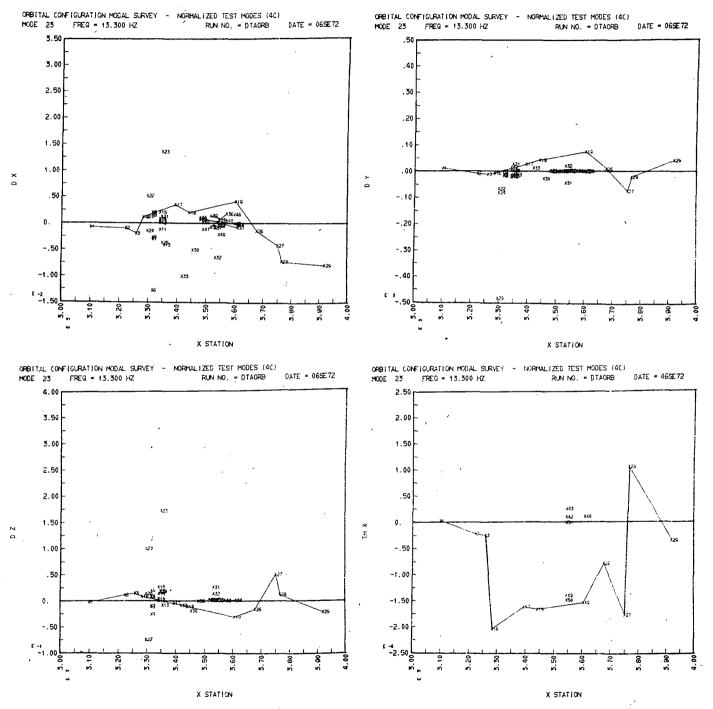


Plot B-20



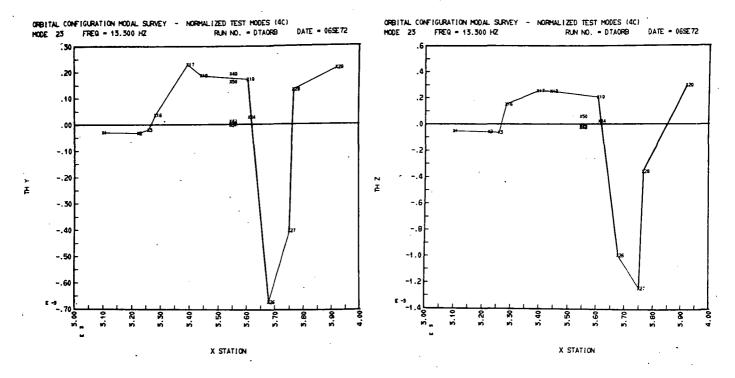


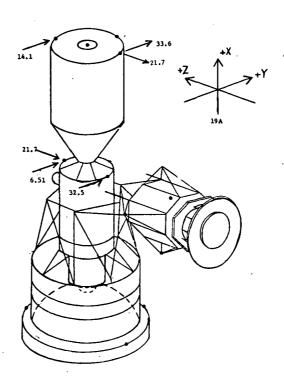




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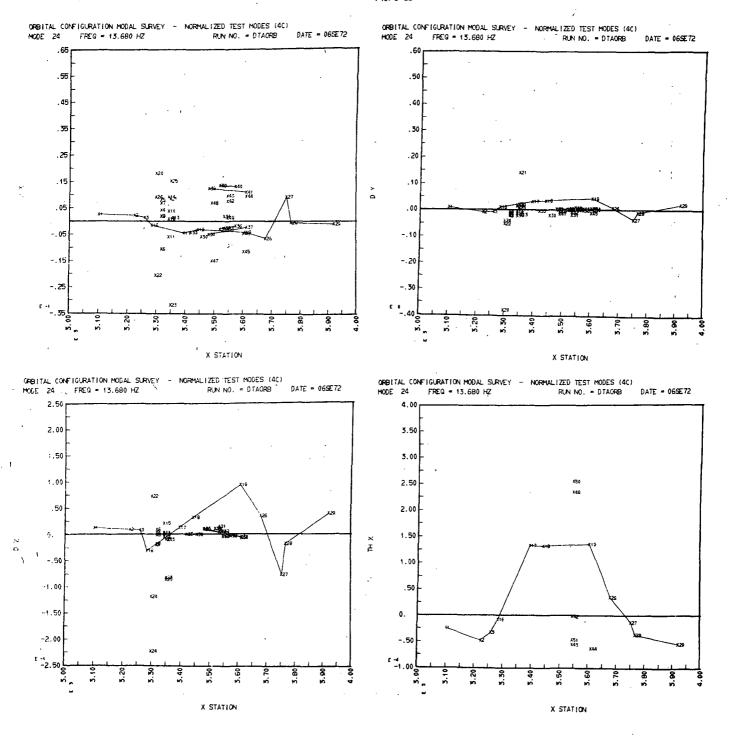
Plot B-21



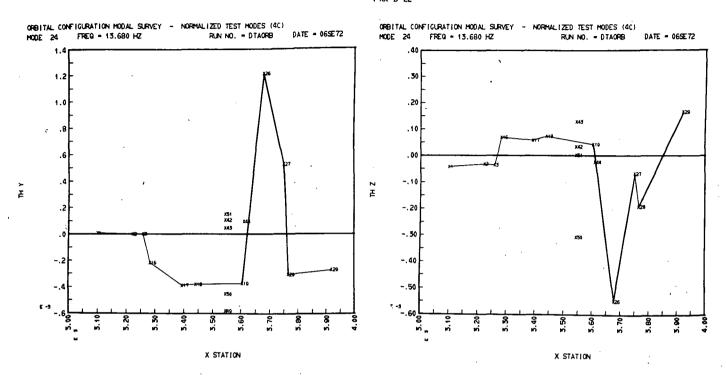


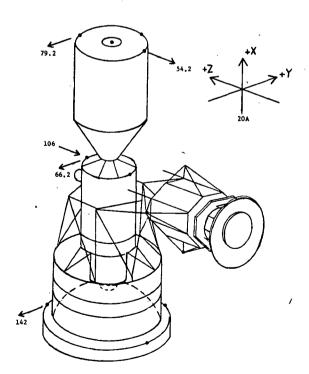
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Plot B-22



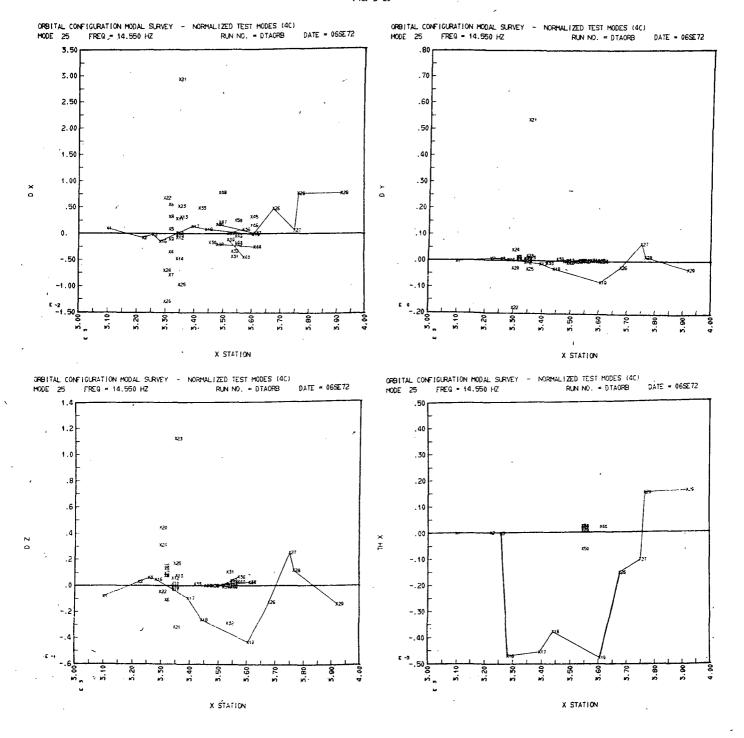
Plot B-22



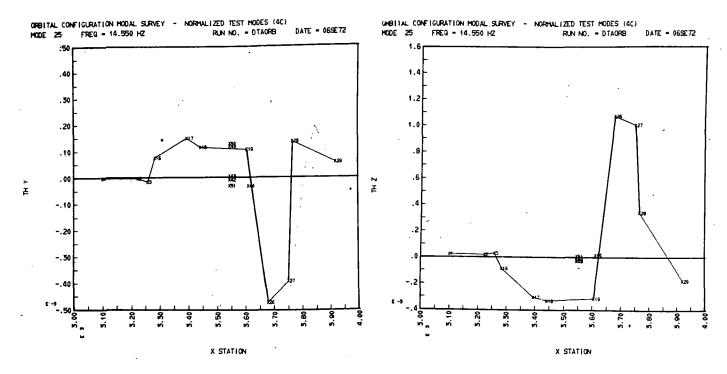


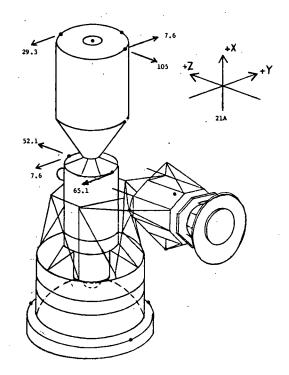
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Plot B-23

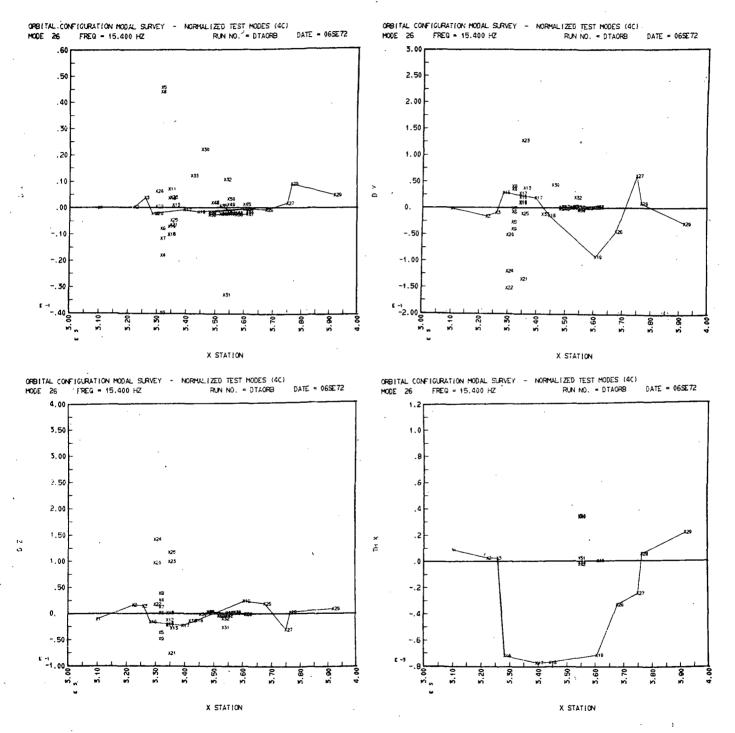


Plot B-23

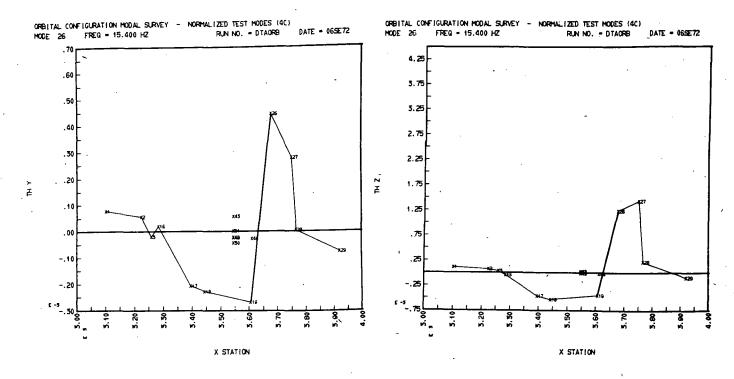


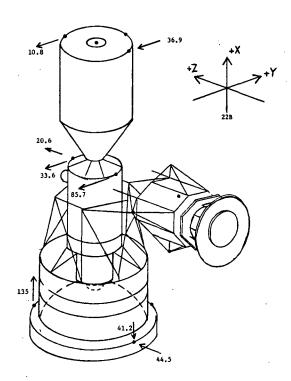


Plot B-24



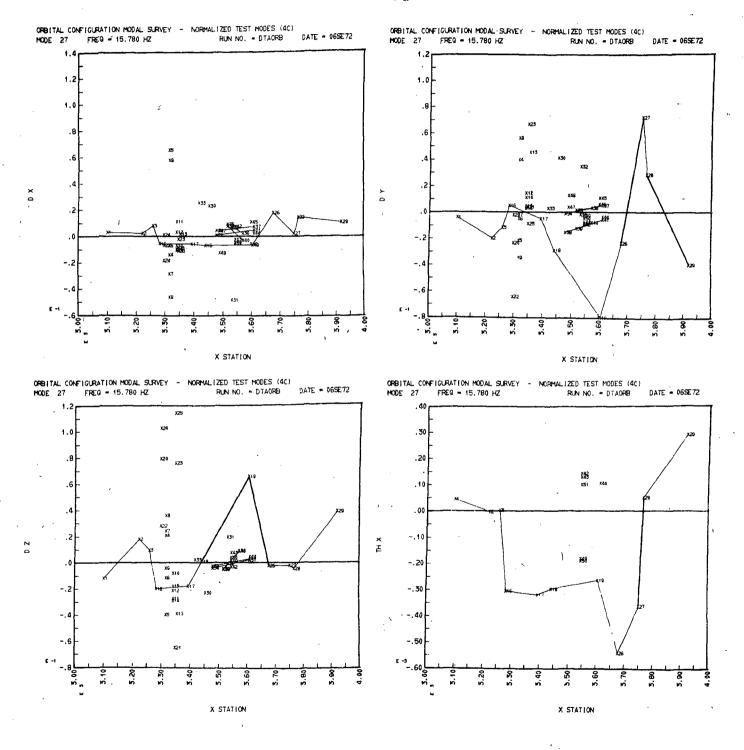
Plot B-24



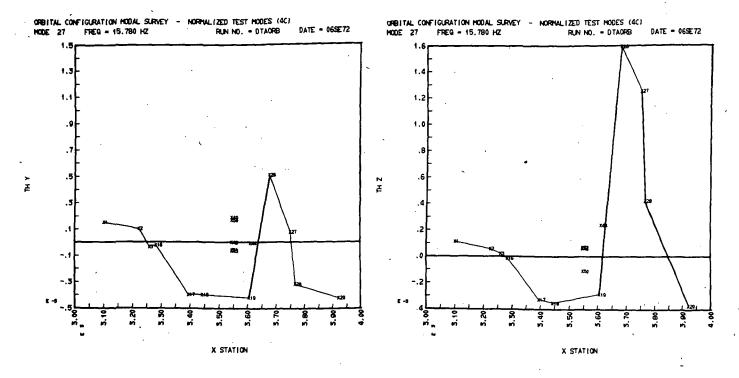


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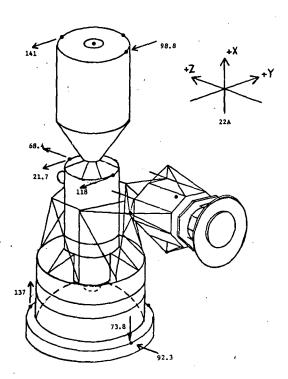
Plot' B-25



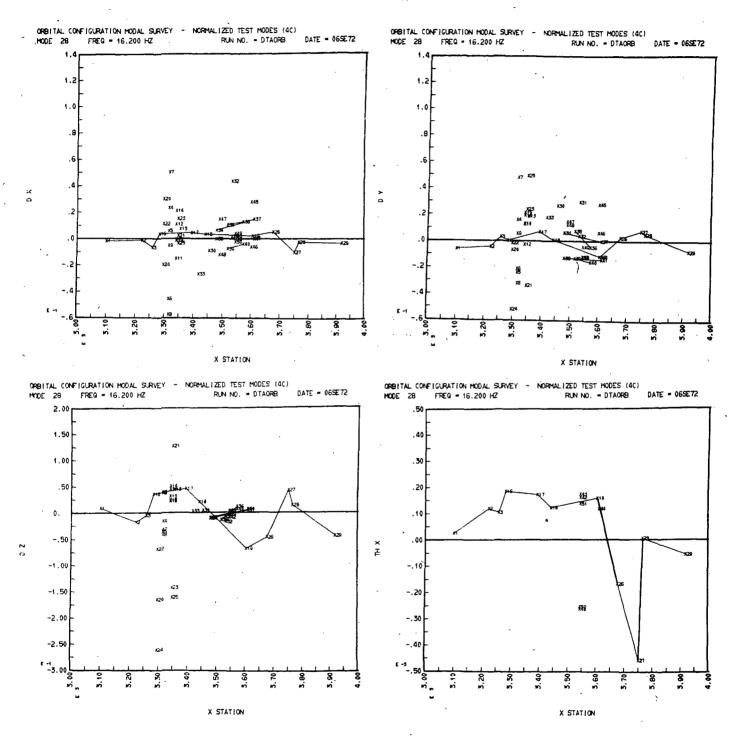
Plot B-25



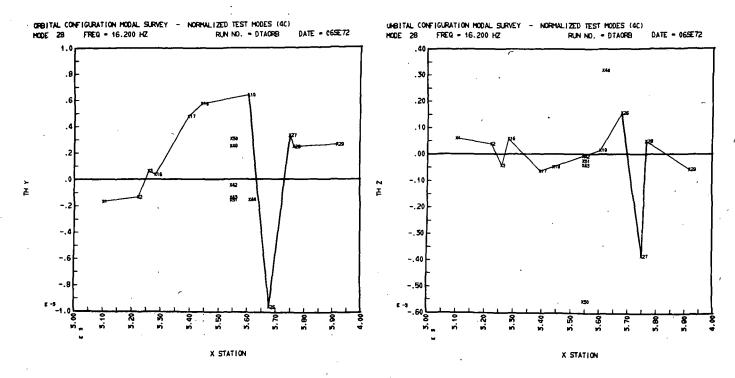
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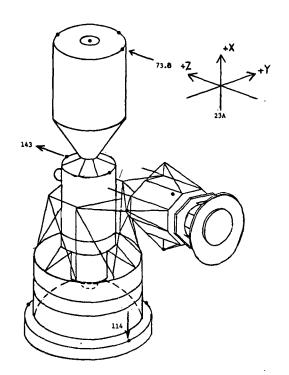


Plot B-26

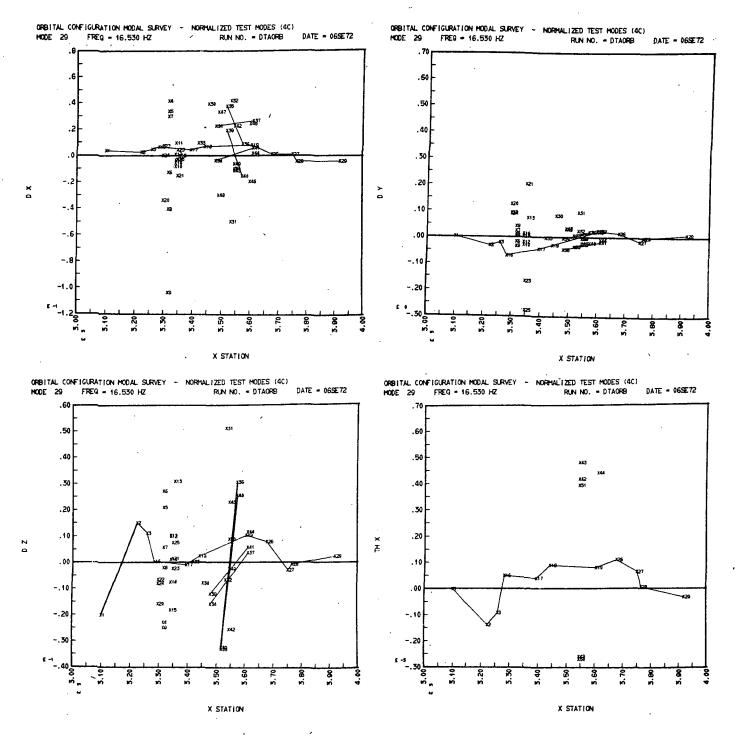


Plot B-26

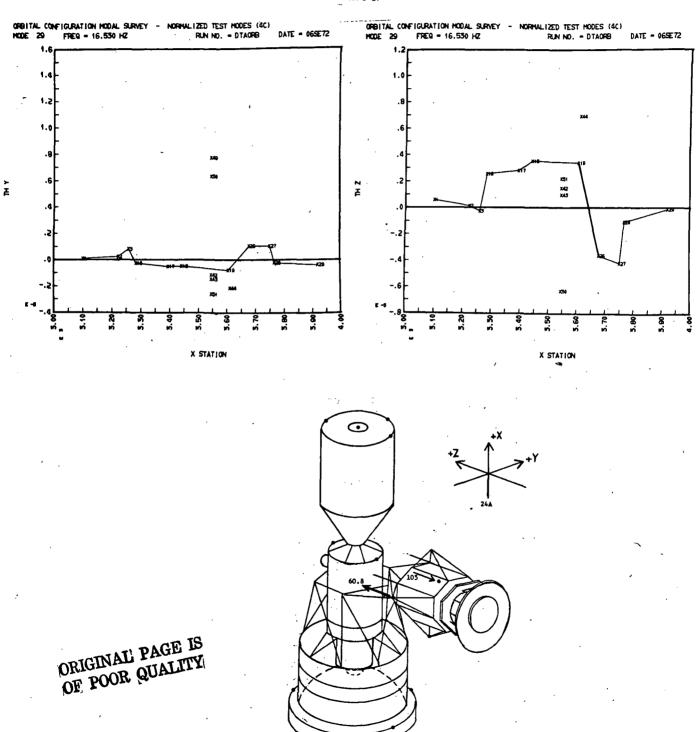




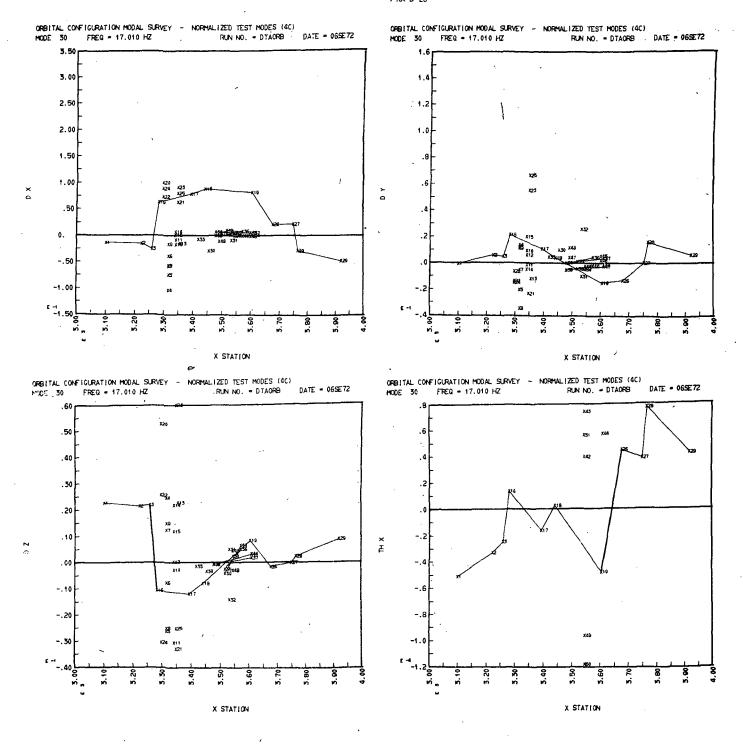
Plot B-27

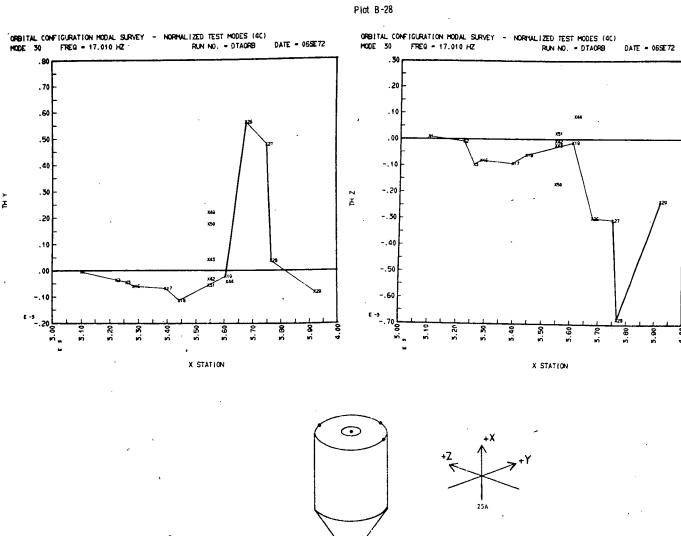


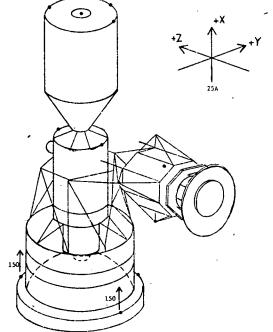
Plot B-27



Plot B-28







SECTION C

Analytical Modes GMC Tables

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The following Tables C-1 through C-40 show GMC data for each of the correlated analytical modes presented in Table 5.17 in the main text of this report. These data are presented in the same manner as the corresponding test data presented in Section A.

TABLE C-1

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 7 ANALYTICAL FREQUENCY = 1.279 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	~ (DX)	(DY)	(DZ)	(LX)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.0250	.0001	.0059	.0301	.0053	.0000
5-FAS 02 TANKS	•0229	.0001	.0046	0 •	8.	Э.
MDA/STS/AM	.0170	.0000	.0094	.0300	.0001	0000
6-AM N2 TANKS	.0036	.0000	.0012	J •	0.	0.
COMMAND/SERVICE 400.	.0253	.0008	. 3135	.0016	.0354	0000
DEPLOYMENT ASSEMBLY	.0021	.0000	• G0 65	0 •	0 • '	J.
ATM-PACK, CMGS, 4-545	. 2914	.0052	. 3688	0300	.0001	.0000
ATH-SPAR CENTER	• G8 3 9	.3001	.0094	.0301	.0027	0.
ATM-GRAZCAN CENTER	.0750	.0000	.3083	.0301	.0048	.0351
SUM	.5471	.0063	• 4269	.0012	.0184	.0002

BR/OWS SKIRT/IU/FAS	.0374
6-FAS OZ TANKS	.0275
MA/STS/ACM	.0255
6-4H N2 TANKS	.03+8
COMMAND/SERVICE MOD.	. 3459
DEPLOYMENT ASSEMBLY	.0057
ATM-RACK, CMGS, 4-SAS	. 3646
AT 4-SPAR CENTER	. 3952
AT4-GRA/CAN CENTER	.0893

C-5 TABLE C-2

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 7 FREQUENCY= 1.28 4Z.

4-4				me and the second			and the second s
RODE	GMC	GMC	GMC	GMC	SMC	GMC	NODE
NO.	(XQ)	(PY)	(DZ)	(TX)	(TY)	(TZ)	
14:5	(0.7)	(0,7	,52,			(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	D230(21 120)
1	.0115	.0000	.0035	.0000	.0030	. 0000	BASE RNG/OWS SKIRT
5	.0032	0000	.0000	.0000	.0004		OWS/IU INTERFACE
3	.0058	.0000	.0'804	.0000	.0019		IU/FAS INTERFACE
4	.0038	0000	.0010	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0050	0000	.0019	0.	0.	0.	FAS 02 B)TL2,+Y +Z
5	.0050	.0000	.0008	0.	0.	0.	FAS 32 B3TL3,-Y +Z
7 7	.0040		.0007		0.		FAS 02 B)TL4,-Y +Z
	•	.0000			0.		
8	.0021		.0007	0.		-	FAS 02 BOTL5, -Y -Z
9	.0010	.0001	.0005	0.	0.		FAS 02 BOTL6, -Y -Z
10	.0005	.0000	.0005	0.	0.		FAS/AM/DA IF, +Y
11	.0028	.0000	.0005	0.	0.		FAS/AM/DA IF, +Z
12	.0010	0000	.0005	0.	0.		FAS/AM/DA IF, -Y
13	.0001	•0000	.0002	0.	0.		FAS/DA IF, -Y -Z
14	.0000	.0000	.0002	0.	0.	0.	FAS/AN IF, -Z
15	.0000	.0000	.0001	. 0 •	0.	0.	FAS/DA IF, +Y -Z
15	.0025	.0000	.0005	.0000			AM TUNNEL/SHEAR WB
17	.0039	.0000	.0025	.0000			AM TUNNEL/STS IF
18	.0058	.0000	,0038	.0000	•11000		MDA/STS INTERFACE
19	.0048	.0000	.0027	0000	0000		MDA CONE/CYL ITRFC
20	.0005	.0000	' 0 0 0 S	0.	0•	0 •	N2 TANK, +Y, LOWER
21	.0006	.0000	0003	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0009	.0000	., 0 00 1	0 •	0.	0.	NZ TANK, +Z, LOWER
23	.0010	.0000	,0092	0 •	0.	0.	N2 TANK, +Z, UPPER
24	.0003	,0000.	.0001	0 •	0 •	0.	N2 TANK -Z, LOWER
25	.0003	.6000	.0002	0.	0 •	0.	N2 TANK, -Z, UPPER
26	.0049	.0000	.0000	.0000	0001	.0000	CM, FWD BULKHEAD
27	.0058	.0001	.0156	0000	.0004	.0000	CM, AFT BULKHEAD
28	.0065	.0001	.0299	.0002	.0008	0000	SM, FWD BULKHEAD
29	.0081	.0006	.2671	.0007	.0044	.0000	SM, AFT BULKHEAD
. 30	0002	.0000	.0002	0.	0.	0.	LOWER D LATCH, DA
31	.0004	0000	.0031	0 •	0.	0.	LOWER +Y TRUNNION
32	.0005	.0000	.0029	0.	0.	0.	LOWER -Y TRUNNION
33	.0013	.0000	.0005	0.	0.	0.	EREP PACKAGE C.G.
34	.0357	.0004	0001	0.	0 .	0.	ATH PN 6,7 IF, OUTP
35	.0488	0001	.0006	0.	0.	0.	ATM PN 4,5 IF, OUTR
- 35	.0737	.0007	.0121	0.	. 0 .	0.	ATH PN 8,1 IF, OUTR
37	.0446	0008	.0259	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0093	.0000	.0005	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0168	.0004	.0007	0 •	0.	0.	ATM PN 4,5 IF, INNR
40	.0315	.0014	.0057	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0055	0003	.0135	0.	0.	0.	ATH PN 2,3 IF, INNR
42	.0054	.0001	.0012	.0000	.0001	.0000	CMG, -Y SIDE
43	.0034	.0000	.0016	0000	.0001	.0000	CMG, +Y SIDE
44	.0072	.0003	.0054	0000	.0000	.0000	CMG, +X SIDE
45	.0004	.0004	0.	0.	0.		
46	.0005	.0006	0.	0.	0.	0.	ATM SAS ,PN 1
40					0.		ATM SAS, PN 3
	.0009	•0009	0.	0 •		0.	ATM SAS, PN 5
48	.0011	.0011	0.	D .	0.	0 •	ATM SAS, PN 7
49 50	.0839	.0001	.0094	.0001	.0027	0.	SPAR CENTER
50	.0750	.0000	.0083	.0001	. 0048	. 0001	GRAZCAN CENTER
61114	F, 71	0067	4060	0040	0404		•
SUM	.5471	.0063	. 4269	.0012	.0184	.0002	

TABLE C-3

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 8 ANALYTICAL FREQUENCY = 1.377 HZ.

GMC	GMC	GMC	GMC	GMC	GMC
(DX)	(DY)	(OZ)	(TX)	(TY)	(TZ)
.0010	.0159	.0015	.0127	.0001	.0357
.0018	.0027	.0030	0 •	0.	0.
.0001	.0032	.0001	.0021	.0000	.0003
.0002	.0005	.0002	0.	0.	0.
.0002	.1140	.0025	.0128	0000	.0033
.0014	.0002	.0013	Ú •	0.	0.
.2751	.4167	.0556	.0004	.0000	.0112
.0007	.0015	.0001	.0153	.0000	0.
.0006	.0013	.0001	.0195	.0003	.0348
-					
.2810	.5561	. 9644	.0527	.0004	.0454
	(OX) .0010 .0018 .0001 .0002 .0002 .0014 .2751 .0007	(OX) (OY) .0010 .0159 .0018 .0027 .0001 .0032 .0002 .0005 .0002 .1140 .0014 .0002 .2751 .4167 .0007 .0016 .0006 .0013	(OX) (OY) (OZ) .0010 .0159 .0015 .0018 .0027 .0030 .0001 .0032 .0001 .0002 .0005 .0002 .0002 .1140 .0025 .0014 .0002 .0013 .2751 .4167 .0556 .0007 .0016 .0001 .0006 .0013 .0001	(OX) (OY) (OZ) (TX) .0010 .0159 .0015 .0127 .0018 .0027 .0030 0. .0001 .0032 .0001 .0021 .0002 .0005 .0002 0. .0002 .1140 .0025 .0028 .0014 .0002 .0013 0. .2751 .4167 .0556 .0004 .0007 .0016 .0001 .0153 .0006 .0013 .0001 .0195	(OX) (OY) (OZ) (TX) (TY) .0010 .0159 .0015 .0127 .0001 .0018 .0027 .0030 0. 0. .0001 .0032 .0001 .0021 .0000 .0002 .0005 .0002 0. 0. .0002 .1146 .0025 .00280000 .0014 .6002 .0013 0. 0. .2751 .4167 .0556 .0004 .0000 .0007 .0016 .0001 .0153 .0000 .0006 .0013 .0001 .0195 .0003

BR/OWS SKIRT/IJ/FAS	.0359
5-FAS 02 TANKS	.0076
MA\STS\AM	.0058
6-AM N2 TANKS	.0008
COMMAND/SERVICE MOD.	.1228
DEPLOYMENT ASSEMBLY	. 3028
ATY-RACK, CMGS, 4-SAS	.7430
AT1-SPAR CENTER	.0177
ATH-GRAZCAN CENTER	.0556

C-7 TABLE C-4

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	AN	ALYTICAL	MODE	3	FREQUE	ENCY= 1	1.38 HZ.
NODE	GHC	GMC	GMC	GMC	SMC	GMC	NOJE
NO.	(XQ)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
4	0.004	0477	0002	.0066	.0001	0035	BASE RNG/OWS SKIRT .
1 2	.9001 9000	.0133 .0009	.0002		.0000		OWS/IU INTERFACE
3	.0000	.0005	.0000	.0038	.0030		IU/FAS INTERFACE
4	.0008	.0002	.0007	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0002	.0007	.0002	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	0330	.0007	.0002	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0004	.0002	.0008	· O • ·	0.	0.	FAS 02 83TL4,-Y +Z
8	.0003	.0003	.0008	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0001	.0008	.0002	0 •	0.	0.	FAS 02 BOTLS,-Y -Z
10	.3305	.0000	.0004	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0010	.0000	0.	0.	0.	FAS/AM/DA IF, +Z FAS/AM/DA IF, -Y
12 13	.0094 .0099	0000. 0000	.0008	G • O •	0.	-	FAS/DA IF, -Y -Z
14	0333	•0002	0000	0.	0.	0.	FAS/AM IF, -Z
15	.0000	.0000	.0000	0.	0.		FAS/DA IF, +Y -Z
15	.0000	•0000	.0000				AM TUNNE / SHEAR WB
17	.0000	.0003	.0000	.0005		.0000	AM TUNNEL/STS IF
18	.0000	.0110	.0000	80008			MDA/STS INTERFACE
19	. •0000	.0019	.0000	.0006	.0000		MDA CONE/CYL ITREC
23	.0001		.0001	0.	G •	0.	N2 TANK, +Y, LOWER
21	.0001	.0000	.0001	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	. •9001	.0000	-	0.	0.	N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER
. 23 24	.0000	.0002 .0001	.0000	0 •	0.	0.	N2 TANK -Z, LOWER
25 25	.0000	.0001	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
25	.0000	.9001	.0000		.0000		CM, FWD BULKHEAD
27	.0000	.0046	.0001	.0004	.0000	.0003	
28	.0001	.0093	.0002	.0009		.0005	SM, FWD BULKHEAD
29	.0001	-1000	.0022	.3010	0001	.0025	SM, AFT BULKHEAD
30	.0000	.0006	.0000	0.	0.	0 •	LOWER D LATC4, DA
31	.9908	0004	.0004	0 •	0.	0.	LOWER +4 TRUNNION
32	.0006	0005	.0009	ů •	Ο. Π.	0.	LOWER -Y TRUNNION
33		.0005	.0000	0.	U •	0 • 8 •	EREP PACKAGE C.G.
34 35	.0045 .0618	•0480 •0057	.0023	0 •	0 • 0 •	0.	ATM PN 6,7 IF, OUTR
35 36	.0538	.0091	.0149	9.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0148	.0704	.0049	0.	0.	ð.	ATM PN 2,3 IF, OUTR
38	0002	0001	.0004	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0275	.0033	.0053	8 •	0 •	0 •	ATM PN 4,5 IF, INNR
40	.0529	.0507	.0047	J •	0.	0.	ATM PN 8,1 IF, INNR
41	.0190	•1756	.0024	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0148	•0055	.0053	.0001	.0000	.0004	
43	.0145	.0051	.0050	.0002	.0000	.0006	
44	.0001	00417	.0001	.0001	0000	.0003	
45 45	0005	•0005	0.	0.	0. 0.	0.	ATM SAS , PN 1 ATM SAS, PN 3
4 D 4 7	.0003 .0005	.0003 .0005	0.	0.	8.	0.	ATH SAS, PN 5
48	10003	•0003	0.	0.	0.	:0.	ATM SAS, PN 7
49	.0007	.0016	.0001	.0153	.0000	0.	SPAR CENTER
50	.0006	.0013	.0001	.0195	.0003		GRAZCAN SENTER
	92 to 45 to						

.0527 .0004

.5561

. 8644

TABLE C-5

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 9 ANALYTICAL FREQUENCY = 1.643 HZ.

COMPONENT	GMC	GMC	GMC	GIC	GMC	GYC
NAME	'(DX)	: (()	(DZ)	(TX)	(TY)	· (TZ)
BP/OWS SKIRT/IU/=15	.0123	.0387	. 0975	.3.28	.G223	.0134
5-FAS 02 TANKS	.0187	.0114	.0120	0 .	0.	0.
MDA/STS/AM	.0050	.0136	.0081	.0377	.0618	.0317
6-AM N2 TANKS	.0015	.0015	.0027	0.	. 0 .	0.
COMMAND/SERVICE 400.	.0076	.10.07	.1005	.0192	.0025	0025
DEPLOYMENT ASSEMBLY	.0026	.0111	. 0129	0.	0.	0.
ATM-PACK, CMGS, 4-34S	.0983	. 8408	. 1594	.0)01	.0001	.0001
ATM-SPAR CENTER	.0264	.0108	.0287	.0028	0011	0.
ATM-GRA/CAN CENTER	.0251	.0084	.0256	.0143	.0026	.0329
	-	***	***	-	***	
SUM	1974	.2372	. 4475	.0569	.0303	.0205

BR/OWS SKIRT/IU/FAS	.2259
6-FAS 02 TANKS	.0421
MAVSTSVAM	.0379
6-AM N2 TANKS	.0058
COMMAND/SERVICE MOD.	. 2232
DEPLOYMENT ASSEMBLY	.0257
AT4-RACK, CMGS, 4-SAS	.2988
ATM-SPAR CENTER	.0697
ATH-GRA/CAN CENTER	.0689



C-9
TABLE C-6

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

-=	AN	LYTICAL	HODE	3	FREQUE	ENCY=	l.64 HZ.
NODE	GMC (DX)	GMC (DY)	GMC (DZ)	GHC (TX)	SMC (TY)	GMC (TZ)	
NO.	(() ()	(0 7)	(021)	(1 ×)	(117)	(12)	DESCRIPTION
1	.0038	.0316	.0790	.0223	.0137	.0081	BASE RNG/OWS SKIRT
2	.0019	.0022		.C074		.0020	ONS/IU INTERFACE
3	.0015	.0012		.0130	.0343	.0932	IU/FAS INTERFACE
4	.0006	.0006	.0G75	0.	C.	0.	FAS 02 BOTL1, +Y +Z
5	.0004	.0023	.0039	0.	0 •	Ċ.	FAS 02 9071.2; +Y +Z
5	0001	.0024	0000	0.	0.	0.	FAS DE BATLE, PY 42
7	.0024	.0007	.0003	0.	0.	0.	FAS 02 93TLA, -Y +Z
8	.0066	.0011	.0002	0.	0.	0	FAS 02 83715,-Y -Z
9	.0087	.0043	.0000	0.	0 .		FAS 02 83716, -Y -Z
10	.0003	.0000	.0021	0.	0.	0 .	FAS/AM/DA IF, +Y
11	.0002	.0033	.0001	8.	0.	0.	FAS/AM/DA IF. +Z
12	.0030	.0001	.0014	0 •	0.	0.	FAS/44/04 IF, -Y
13	.0004	0002	.0002	0.	0 •	0.	FAS/04 IF , -Y -Z
14	.0011	.0006	.0001	0.	0.	0 .	FAS/AM IF, -Z
15	.0001	0000	.0001	0.	0 .	e 0	FAS/DA IF, +Y -Z
16	.0008	.0001	.0014				AM TUNNE / SHEAR WB
1 7	.0012	.0008					AM TUNNELISTS IF
18	.0117	.0839	.0012	.0027	.0510	.0610	MOAZSTS INTERFACE
19	.0014	.0088	.0055	.0026			MDA CONEZCYL ITRFC
20	.0000	.0000	.0012	0 •		. 0 .	N2 TANK, +Y, LOWER
21	.0000	.0000	.0007	0.	ø.	0.	NZ TANK, +Y, UPPER
22	0000	.0062	.0003	0.	0.	0.	NO TANK, +Z, LOWER
23	.0000	.0005	.0001	0.	0.0	0.	NZ TANKO +Z, UPPER
. 24	.0007	.0005	.0003	0, •	0.	0.	N2 TANK -Z, LOWER
25	.0008	.0002	.0001	0.	3.	0.	N2 TANK, -Z, UPPER
26	.0018	.0045	.0029				CM, FWO BULKHEAD
27	.0323	.0003	•0009	.0022	.0004		CM, AFT BULKHEAD
28	.0014	.0028	.0034	.0030			SM, FHO BULKHEAD
29	.0020	.0931	.0934		.0014		SM, AFT BULKHEAD
30	.0014	.0000	.0066		G.	0 •	LOWER D LATCH, DA
31	.0001	.0085	.0017	0.	0.	0.	LOWER OF TRUNMION
32	.0310						LOWER - F TRUNNION
33	.0000	.0017	.0000	0.	8.	Ű • `	EREP PACKAGE C.G.
34	.0046	.0179	00475	0.	0.		ATM PN 5,7 IF, OUTR
35	.0371	.0074	. 6049	0.	0.	0.0	ATM PN 4,5 IF, CUTR
36	.0059	.0037	.0293	0.	0.	6.	ATM PN 3,1 IF, OUTR
37	.0162	.0000	00014	0 •	0.	0.	ATM PN 2,3 IF, OUTR
38	~0013	.0045	.0332	0.	0.	ប្ត	ATM PN S.7 IF, INNR
39	.0192	.0009	.0031	្សិ _ខ	0.	0.	ATM PN 4,5 IF, INNR
40	0001	0007	.0212	0.	0 •	0 0	ATM PN 0,1 IF, INNR
41	.0054	.0050	.0044	0.	0.	0.	ATH PH 2,3 IF, INNR
42	.0060	.0001	.0010	.0000	.0000	.0000	
43	.0001	.0002	.0114	.0001.		.0001	
i , i,	.0016	.0007	.0021	.0000	.0000	.0990	
45	.0002	.0002	0 • ·	0 .	0.	0.	ATM SAS , PN 1
45 67	.0007	.0007	0 •	ð .	0.	0.	ATH SAS, PH 3
47	0000	0000	8 .	0.	0.	0.	ATM SAS, PN 5
¥8	.0000	.0000	0 0 00 7	0.	0.4.1	9.	ATH SAS, PN 7
49 5 0	.0264	.0108	.0287	0028	.0011	0.	SPAR CENTER
50	.9251	.0084	.0256	.0043	3 200°		GRAZCAN DENTER
SUM						6 0 0 0 6 0 0 0	•
274	.1974	. 237 2	. 4475	。0669	.0303	.3208	

TABLE C-7

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 10 ANALYTICAL FREQUENCY = 1.670 HZ.

COMPONENT	GMC	GMC	GMC	Ġ¶C	GMC	GHC
NAME	(DX)	(DY)	(DZ)	·(TX)	(T <u></u> Y)	(TZ)
BRIONS SKIRT/IU/FAS	.0107	• 0 6 88	. 0585	.0575	.0146	.0232
5-FAS 02 TANKS	.0070	.0113	.0190	0.	€.	0.
MDA/STS/AM	.0043	.0226	.0066	.0103	.0013	.0025
5-AM N2 TANKS	.0025	.0021	.0008	0.	0.	0.
COMMAND/SERVICE MOD.	.0077	.1608	.0617	.3260	.0029	.0089
DEPLOYMENT ASSEMBLY	.0030	.0094	.0087	0 •	0.	0.
ATM-PACK, CMGS, 4-SAS	.0842	.0796	.1013	.0301	.0000	.0002
ATH-SPAR CENTER	.0165	.0185	. 0195	.0058	.0007	0.
ATM-GRAZCAN CENTER	.0133	.0183	.0169	.0379	.0008	.0041
SUM	.1490	.3913	. 2930	.1176	.0202	.0390

BRIONS SKIRT/IU/FAS	. 2334
6-FAS 02 TANKS	. 3372
MAISTSIAM	.0474
6-AM N2 TANKS	.0054
COMMAND/SERVICE MOD.	. 2630
DEPLOYMENT ASSEMBLY	.0211
ATM-RACK, CMGS, 4-SAS	. 2654
AT4-SPAR CENTER	.0609
AT4-GRA/CAN CENTER	. 0613

C-11 TARLE C-8

FREQUENCY= 1.67 4Z.

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL HODE 10

SUM

.3913

. 2930

.1076

.0202

.0390

1.5	· · · · · ·	ACLITONE	י שחחוב ז	U minuserani, ii	r < E Q U	ENCY	1.0/ 1/2.
NODE	GMC	GMC	GH C	GMC	GMC	GMC	NODE
NO.	(XQ)	(DY)	(DZ)			(TZ)	
1	£0030	.0570	.0454	.0298			BASE RNG/OWS SKIRT
2	.0011	.0840	-0041			.0043	OHS/IU INTERFACE
3	.0011	.0023	.0034	.0171	.0329	.0048	IU/FAS INTERFACE
4	.0037	.0007	.0014	0.	0.	0 .	FAS D2 BOTL1,+Y +Z
5	0001	.0029	.0001	0.	Ů.	0.	FAS 02 BOTL2,+Y +Z
5	.0003	.0027	.0028	0.	0.	0.	FAS 02 B)TL3,-Y +Z
7		.0007	.0065	0.	0.	0.	FAS 02 B)TL4,-Y +Z
. 8	0000	.0013	.0051	0.	0.	0.	FAS 32 B3TL5,-Y -Z
9		.0030	.0020	0.	0.	0.	FAS 32 BOTL6,-Y -Z
10	.0030	0000	.0016	0 •	0.	0.	FAS/AM/DA IF, +Y
11	.0091	.0043	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0010	•0001	.0037	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0000	0001	.0002	0.			FAS/DA IF, -Y -Z
14	.0009	.0011	• 0 00 0	0 •	0.		FAS/AM IF, -Z
15	•0005	.0001	.0001		0.	0.	FAS/DA IF, +Y -Z
15	.0006	.0002	•0006	.0008	•0003	.0006	AM TUNNEL/SHEAR MB
17	.0310	.0013	.0001	.0025	.0002	.0004	AM TUNNE_/STS IF
18.	.0014	.0063	.0014	.0040	.0007	.0017	AM TUNNE./STS IF MDA/STS INTERFACE
19	.0311	.0148	• 0045	.0030	.0031	_ 0000	MDA CONFICYL TIREC
20	.0007	.0000	.0001	0.	0.	0.	N2 TANK, +Y, LOWER N2 TANK, +Y, UPPER N2 TANK, +Z, LOWER
21	.0007	.0000	.0004	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0003	60001	0.	0.	0.	
23	.0000	.0008	0000	0.	Ų •		
24	.0005	.0007	~0001			~ •	NZ TANK -Z, LOWER
25	.0006	.0003	.0000		0.	0.	NZ TANK, -Z, UPPER
25 2 7	.0013	0078	.0033	.0035	.0002	.0002	CM, FNO BULKHEAD
27	.0015		• 0 0 0 0	.0038	.0002		CM, AFT BULKHEAD
28 29	.0021	.0044	.0018	• 6 0 7 0	.0001	.0015	SM, FHD BULKHEAD
		•1483					SM, AFT BULKHEAD
31	.0010 .0015	.0001 0001	.0042	0.	0. 0.		LOHER D LATCH, DA
32		.0071	.0038 .0007			0.	LOHER +Y TRUNNION
33		.0071	• 0 0 0 7	0.	0.	0.	LOHER -Y TRUNNION
34	.0134	.0466	041.5	.0.	0.		EREP PACKAGE C.G.
35	0003	.0160	.0145 .0317	0.	0.	0. 0.	ATM PN 6,7 IF, OUTR
36	• 0336	.0026	0001	0.	0.	0.	ATM PN 4,5 IF, OUTR ATM PN 8,1 IF, OUTR
37	.0047	.0027	.0082	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	• 0 0 5 5	.0065	.0129	0.	0.	C.	ATH PN 6,7 IF, INNR
39	0013	0010	.0117	0.	0.	0.	ATM PN 4,5 IF, INNR
40	0205	.0023	.0003	0.	0.	0.	ATM PN 8,1 IF, INNR
41	0002	.0022	.0104	0.	0.	0.	ATM PN 2,3 IF, INNR
42	0000	.0003	.0102	.0000		.0000	CMG, -Y SIDE
43	.0054	.0002	.0001		.0000	.0001	
44	.0011	.0005	.0014		.0000	.0001	CMG, +X SIDE
45	.0006	.0006	0.	0.	0.	0.	ATH SAS , PN 1
46	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0.		0.	ATH SAS, PN 5
48	0000	0000	0.	0.	0.	0.	ATH SAS, PN 7
49	.0165	.0185	.0195		0007		SPAR CENTER
50	.0133	.0183		.0079	.0038		GRAZOAN SENTER

TABLE C-9

ORBITAL CONFIGURATION HODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 11

ANALYTICAL FREQUENCY = 2.	, 335	MZ.
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COMPONENT	GMC	GMC	GMC.	G4C	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	, (TZ)
BP/OWS SKIRT/IU/FAS	.0037	.0483	.0080:	.1354	.0000	.0320
5-FAS 02 TANKS	.0101	.0248	.0251	0.	0 •	0 •
MD A/STS/AM	.000 0	.1250	.0007	.0155	.0001	.0081
5-AM N2 TANKS	.0005	.0078	.0024	0.	0.	0.
COMMAND/SERVICE 400.	0000	.2101	.0009	.0577	000i	.0119
DEPLOYMENT ASSEMBLY	.0369	.0286	0006	0.	0.	S •
ATM-PACK, CMGS, 4-SAS	.0147	.1049	.0357	.0002	.0000	.0000
ATM-SPAR CENTER	.0001	.0330	.0000	.0165	.0000	0.
ATM-GRAZCAN CENTER	.0000	.0303	.0000	.0193	.0001	=
SUM	.0361	.6128	.0723	.2246	.0061	.0541

BRIONS SKIRT/IU/FAS	. 1973
6-FAS 02 TANKS	.0610
MD4/STS/AM	.1493
6-AM N2 TANKS	.0108
COMMAND/SERVICE MOD.	.3116
DEPLOYMENT ASSEMBLY	.0349
ATM-RACK, CMGS, 4-SAS	.1557
ATM-SPAR CENTER	.0395
AT4-GRA/CAN CENTER	.0419

C-13 TABLE C-10

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 11

FREQUENCY= 2.34 4Z.

NODE	•				SMC		
NO.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TŽ)	DESCRIPTION
1	.0000	.0363	.000 1	.0561			BASE RNG/OWS SKIRT
2	.0000	0000	0000	.0180			OWS/IU INTERFACE
3	.0000	.0002	.0001	.0313	.0000	.0094	IU/FAS INTERFACE
4	.0024	0000	.0076	0.	0.	0.	FAS 32 B3TL1,+Y +Z
5	.0008	.0017	.0028	0 •	0.	0.	FAS 02 B)TL2,+Y +Z
5	.0007	.0017	.0015	0.	0.	0.	FAS 02 BJTL3,-Y +Z
7	.0023	0000	.0054	G •	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0037	.0080	.0066	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0003	.0134	.0011	0.	0.	0.	FAS 32 B3TL6,-Y -Z
10	.0013	.0013	.0036	0 • -	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0011	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0020	.0019	.0043	0.	Ü.	0.	FAS/AM/DA IF, -Y
13	.0001	.0012	0032	0 •	0.		FAS/DA IF, -Y -Z
14	.0000	.0055	.0000	0.	0.	0.	FAS/AM IF, -Z
15	.0002	.0007	.0001	0.	0.	0.	FAS/DA IF, +Y -Z
15	0000	.0011	.0000				AM TUNNEL/SHEAR WB
17	.0000	.0126	.0001		.000C		AM TUNNEL/STS IF
18	.3000	.0406	.0002		.0000		MDA/STS INTERFACE
19	.0000	.0706	.0003	0033			MDA CONE/CYL ITRFC
20	.0003		0011	0.	0 •	0 .	N2 TANK, +Y, LOWER
21	.0003	.0011	.0012	0.	0.	0 •	N2 TANK, +Y, UPPER
22	.0000	.0002	.0030	0.	0.	· O •	NZ TANK, +Z, LOWER
23	.0000	.0000	.0000	0 •	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0022	.0000	0 •	0.	0.	N2 TANK -Z, LOHER
25	.0000	.0040	.0000	0 •	0 •	0.	N2 TANK, -Z, UPPER
26	•0000.	.0612	.0006	.0088			CM, FWD BULKHEAD
27	.0000	.0143	_	.0137	.0000		CM, AFT BULKHEAD
28	0000	.0041	0000	.0258	.0000		SM, FWD BULKHEAD
29	0000	.1305	0001	•G394	0001		SM, AFT BULKHEAD
30	.0000	•0299	.0000	0 • .	0.	0.	LOWER D LATCH, DA
31	.0034	0010	0003	0.	0.	0.	LOHER +Y TRUNNION
32	.0035	0004	0003	0.	0.	0.	LOHER -Y TRUNNION
33	0000	.0001	.0000	0 •	0 •		EREP PACKAGE C.G.
34	0002	.0120	.0019	0 •	0.	0 •	ATM PN 6,7 IF, OUTR
35	.0011	.0115	.0082		0.	0.	ATM PN 4,5 IF, OUTR
35	.0037	.0203	.0099	0.	0.	0.	ATM PN 8,1 IF, OUTR
. 37	.0018	•0479	.0011	0 •	0.	0 •	ATM PN 2,3 IF, OUTR
38	.0001	.0002	.0014	0 •	0.	0.	ATM PN 6,7 IF, INNR
39	.0029	.0001	.0014	0 •	0.	0.	ATM PN 4,5 IF, INNR
40	.0022	.0013	.0055	0.	. 0.	0.	ATM PN 8,1 IF, INNR
41	.0010	.0064	.0011	0.	0.	0.	ATH PN 2,3 IF, INNR
42	.0009	.0008	.0022	.0001	.0006	.0000	CMG, -Y SIDE
43	.0006	.0009		.0001	.0000	.0000	CMG, +Y SIDE
44	.0000	.0031	.0000	.0001	.0000	.0000	CMG, +X SIDE
45	.0001	0001	0.	0.	0.	0.	2 14 7 111 4
46	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 3
47	.0002	.0002	0.	0.	0.	0.	ATM SAS, PN 5
48	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 7
49	.0001	.0330	.0000	.0065	.0000	0.	SPAR CENTER
50	.0000	.0303	.0000	.0093	.0001		GRAZCAN CENTER
C1114	0764				0004	0.57.4	•
SUM	.0361	•6128	.0723	. 2246	.0001	.0541	

.

TABLE C-11

ORBITAL CONFIGURATION MODAL SURVEY . ANALYTICAL 10DES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 12 ANALYTICAL FREQUENCY = 3.151 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	. G4C .
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BRIOWS SKIRT/IU/FAS	.0019	.0002	. 0155	.0325	.0104	.0000
5-FAS 02 TANKS	.0027	.0012	.0045	J .	0.	0.
MDA/STS/AM	.0008	.0003	. 1875	.0301	.0221	0000
5-AM N2 TANKS	.0013	.0801	.0020	0.	0.	0.
COMMAND/SERVICE MOD.	.0027	.0068	. 3629	.0101	.0121	.0002
DEPLOYMENT ASSEMBLY	.0004	.0240	.0137	0.	0 •	0.
ATM-PACK, CMGS, 4-SAS	•01 5 9	.0028	. 2354	.0000	.6961	.0008
ATM-SPAR CENTER	.0007	.0003	.0476	.0002	.0018	0.
ATM-GRA/CAN CENTER	.0005	.0002	. 94 20	.0302	.0025	0000
SUM	.0268	.0298	.8811	.0130	.0490	.0003

BR/OWS SKIRT/IJ/FAS	. 3306
6-FAS OZ TANKS	.0054
MDA/STS/AM	.2139
6-AM N2 TANKS	.0030
COMMAND/SERVICE MOD.	.3888
DEPLOYMENT ASSEMBLY	. 3351
ATM-RACK, CMGS, 4-SAS	. 2242
AT1-SPAR CENTER	.0515
AT4-GRA/CAN CENTER	.0455

C-15 TABLE C-12

GENERALIZED HASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	AN	ALYTICAL	MODE 1	2	FREQU	ENCY= 3	3.15 +Z.
·=		652					· · · · · · · · · · · · · · · · · · ·
NODE	GMC (DX)	GMC (DY)	GMC (DZ)	GMC (TX)	3MC (TY)		
1	0002	.0000	.0133	.0013	.0360	.0000	BASE RNG/OWS SKIRT
ž	.0001	0000	.0001	.0004	.0015	.0000	OWS/IU INTERFACE
3	.0001	0000	.0000	.0004 .0008	.0030	.0000	IU/FAS INTERFACE
4	.0000	.0000	.0000		0.	J.	FAS 02 BOTL1,+Y +Z
5	.0004	.0000	.0004	n.	n .	0 -	FAS D2 RITI2.47 47
5	.0005	.0005	.0014	0.	0.	0	FAS 12 BITLE, TV A7
7	.0000	.0001	.0011	0.	0 • 0 • 0 •	n.	FAS 02 BITLL -Y A7
8	.0004	.0002	.0008	0	0. 0. 0.	0.	FAS 02 BJTL3, -Y +Z FAS 02 BJTL4, -Y +Z FAS 02 BJTL5, -Y -Z
9	.0012	.0002	.0008	0.	0.	0.	FAS 02 BOTL6, -Y -Z
10	.0012		.0000	0.	0	0	FAS/AM/DA IF, +Y
			.0000	0.			FAS/AM/DA IF, +Z
11				0.	0	0.	FAS/AM/DA IF, -Y
12	.0001	0000	.0008	0.	0 • :	0.	FAS/DA IF, -Y -Z
13		•0000	0000	0.	0.	0 •	FAS/AM IF, -Z
14		.0000	.0004				
15	.0000	.0000	0000		0.000		FAS/DA IF, +Y -Z AM TUNNE_/SHEAR WB
16	.0002						
17	.0003	.0000		.0000			AM TUNNEL/STS IF
18	.0002		•0550		.0169		MDA/STS INTERFACE
19	.0032	.0002	.1246	.0001			MDA CONE/CYL ITRFC
S.C.	.0000	.0000	.0000	0.	0.	0.	N2 TANK, +Y, LOWER
21	• 9 0 0 0	•0000	.0003	0.	0.	0 •	N2 TANK, +Y, UPPER
22	.9831	.0000	.0002		0.	ti e	N2 TANK, +Z, LOWER
23	.0001	.0000	.0007	0.	0.	U •	N2 TANK, +Z, UPPER
24	.0004	•0000	.0002	0.		0.	N2 TANK -Z, LOHER
25	.0003	.0000	.0007	0.	0.	0.	
25	.0006	.0003	•1428	.0011	.0008		CM, FHO BULKHEAD
27	.0008	.0002	.0631	.0015	0305		CM, AFT BULKHEAD
29	.0005	.0000		.0013	.0928	0000	SM, FWD BULKHEAD
29	.0008	.0003	.1333				SM, AFT BULKHEAD
30	0001		.0123		0.	0.	
31	• 9 0 0 4	.0122	.0092	0 •		0.	
32	.0001		0001				LOWER -Y TRUNNION
33	.0000	.0000	.0014	0.	0.	0.	EREP PACKAGE C.G.
34	.0002	.0007	.0480	0 •	0.	0.	ATM PN 6,7 IF, OUTR
35	.0006	•0006	.0255	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0003	.0002	.0153	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0003	.0001	.0158	0.		0.	ATM PN 2,3 IF, OUTR
38	.0012	.0003	.0424	0 •		0.	ATM PN 6,7 IF, INNR
39	.0019	.0000	.0125	8 •	0.		ATM PN 4,5 IF, INNR
40	.9057	0001	.0128	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0025	.0001	.0142	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0007	.0000	.0084	0000	0000	.0000	
4.3	.0008	.0000	.0065	0000	• 4441	• 4040	
44	.0010	•0000	.0040	.0000	.0000	.0000	-
45	0000	0000	0.	0.	0.		ATH SAS , PN 1
46	0000	0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0004	.0004	0.	0 •	0.	0.	ATM SAS, PN 5
48	.0035		. 0	0.	0.	0.	ATM SAS, PN 7
49	.0007	.0003	.0476	.0002	.0018	0.	SPAR CENTER
5.0	.0005	.0002		.0002	.0025		GRA/CAN SENTER
		***			***		

SUM

.0268

.0298

.8811

.0130

.0490

.0003

TABLE - C-13

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 13

ANALYTICAL FREQUENCY = 3.532 HZ.

			• •		
GMC	GHC	GMC	G4C	GMC	GMC
(XG)	(DY)	(DZ)	(TX)	(TY)	(TZ)
.0001	.0064	.0066	.0802	.0003	.0001
.0000	.0261	. 0248	0.	0.	0.
.0000	.0005	.0048	.0317	.0003	.0001
.0000	.0014	.0012	0.	0.	0.
.0001	.0031	.0072	.8314	.0005	.0080
0001	.0058	.0010	0.	0.	0.
.0032	.0073	.0091	.0300	.0000	.0000
.0000	.0007	.0004	.0314	.0001	0.
• 0 0 0 0	.0007	.0003	.0019	.0002	.0008

.0034	.0521	. 0555	.8366	.0014	.0010
	(DX) .0001 .0000 .0000 .0001 -0001 .0032 .0000	(DX) (DY) .0001 .0064 .0000 .0261 .0000 .0005 .0000 .0014 .0001 .00310001 .0058 .0032 .0073 .0000 .0007	(DX) (DY) (DZ) .0001 .0064 .0066 .0000 .0261 .0248 .0000 .0005 .0048 .0000 .0014 .0012 .0001 .0031 .00720001 .0058 .0010 .0032 .0073 .0091 .0000 .0007 .0004	(DX) (DY) (DZ) (TX) .0001 .0064 .0066 .0302 .0000 .0261 .0248 00000 .0005 .0048 .0017 .0000 .0014 .0012 00001 .0031 .0072 .80140001 .0058 .0010 00032 .0073 .0091 .0000 .0000 .0007 .0004 .0014 .0000 .0007 .0003 .0019	(DX) (DY) (DZ) (TX) (TY) .0001 .0064 .0066 .0302 .0003 .0000 .0261 .0248 0. 00000 .0005 .0048 .0017 .0003 .0000 .0014 .0012 0. 00001 .0031 .0072 .8014 .00050001 .0058 .0010 0. 00032 .0073 .0091 .0000 .0000 .0000 .0007 .0004 .0014 .0001

BR/OWS SKIRT/IU/FAS	. 1937
6-FAS 02 TANKS	.0519
MD4/STS/AM	.0075
6-AM N2 TANKS	.0027
CO1MAND/SERVICE MOD.	.8123
DEPLOYMENT ASSEMBLY	.0057
ATM-RACK, CMGS, 4-SAS	.0137
AT 1-SPAR CENTER	.0025
AT4-GRA/CAN CENTER	.0040

C-17 TABLE C-14

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 13 FREQUENCY= 3.53 4Z.

				-			
NODE	GMC	GMC	GMC	GHC	SMC	GNC	NODE
NO .	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
		,					
1	.0000	.0002	.0001	• G 420			BASE RNG/OWS SKIRT
2	.0000	.0001	0000	.0139	.000C		OWS/IU INTERFACE
3 .	.0000	•9003	.0001	.0243	.0001	• 0 00 0	IU/FAS INTERFACE
4	0000	.0022	.0083	0.	Û•	0.	FAS 02 B3TL1,+Y +Z
5	0000	.0068	.0034	0.	0.	0.	FAS 02 BOTL2,+Y +Z
6	.0000	.0063	.0014	0.	0.		FAS 02 BOTL3,-Y +Z
7	.0000	.0021	.0052	0.	9.		FAS 02 BOTL4,-Y +Z
8	.0000	.0023	.0052	0.	0.		FAS 02 BOTL5,-Y -Z
ģ	. 1010	.0064	.0013	0.	0.		FAS 02 BOTLS, -Y -Z
10		0000	.0030	0.	0.	8.	FAS/AN/DA IF, +Y
11	.0001	.0041	.0001	Q.	0.		FAS/4M/D4 IF, +Z
			.0031	0.	0.	0.	FAS/AM/DA IF, TY
12	.0000	0000					
13	.0000	.0001	.0001	0.	g.		FAS/DA IF, -Y -Z
14	.0000	.0018	.0001	0.	0.	0.	FAS/AN IF, -Z
15	.0000	.0001	.0002	0.	0.	0.	FAS/DA [F, +Y -Z
15	. 0000	.0000			.0000		AM TUNNE_/SHEAR HB
17	•0000	.0000			•0000		AM TUNNEL/STS IF
18	.0000	.0001		•000 6	.0003		MDA/STS INTERFACE
19	0000	.0004	.0027				MDA CONE/CYL ITRFC
20	.0000	• 0,00 C	.0007	0.	0.	0.	N2 TANK, +Y, LOHER
21	.3000	.0000	.0004	0.	0 •	0.	N2 TANK, +Y, UPPER
22	.0000	.0005	.0000	0.	0.	0.	NZ TANK, +Z, LOWER
23	•0000	.0002	.0000	0.	0.	0.	NZ TANK, +Z, UPPER
24	.0000	.0005	.0000	0.	0.	0.	N2 TANK -Z, LOWER
25	. 3000	.0002	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0000	.0011	.0013	.0749	.0001		CM, FHD BULKHEAD
27	.0000	.0007	0001	.1144	0000	.0000	CM, AFT BULKHEAD
28	.0000	0000	0005		.0001	.0000	· · · · · · · · · · · · · · · · · · ·
29	• 0 0 0 0	0013	.0065	.3658	.0004		SM, AFT BULKHEAD
30	0000	.0031	.0002	0.	Ø •	0.	LOWER D _ATC+, DA
31	0001	.0002	.0005	0 .	0.	0.	LOWER +Y TRUNNION
3?	0000		.0002	0.	0.	0.	LOWER -Y TRUNNION
33	0000	.0023	.0001	C.	0.	0 .	EREP PACKAGE C.G.
34	0000	.0000	.0015	0 .	0 •	0.	ATM PN 6,7 IF, OUTR
3.5	.0005	.0002	.0005	0.	0.	D •	ATM PN 4,5 IF, OUTR
36	.0006	.0009	.0023	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0003	.0028	.0001	0.	0.	٥ .	ATM PN 2,3 IF, OUTR
38	0000	.0026	.0014	0.	0 •	0.	ATM PN 6,7 IF, INNR
39	.0013	.0007	.0002	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0000	.0001	.0017	0.	0.	٥.	ATM PN 8,1 IF, INNR
41	.0001	.0000	.0001	0.	0.	8.	ATM PN. 2,3 IF, INNR
42	.0003	.0001	.0002	.0000	.0000	.0000	CMG, -Y SIDE
43	.0001	.0000	.0010	.0000	.0000	.0000	CMG, +Y SIDE
44	.0000	.0000	.0000	•0000	.0000	.0000	CMG, +X SIDE
45	0000	0000	0.	0.	0.	0.	ATM SAS , PN 1
45	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 3
.47	.0000	.0000	0.	0	0 •	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	C .	ATM SAS, PN 7
49	.0000	.0007	.0084	.0014	.0001	0.	SPAR CENTER
50	.0000		.0003	.0019	.0002	.0008	GRAZCAN DENTER
	* ** **		** ** ** **	~~~~		€ 100 € 1	· .
SUM	.0034	.0521	. 0555	.8866	.0014	.0010	, -

TABLE C-15

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 14 ANALYTICAL FREQUENCY = 4.323 HZ.

COMPONENT	GMC	GMC	GMC	G1C	GMC	GYC
NAME	(XG)	(PY)	· (DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRT/IU/FAS	.0004 .	.0133	.0018	.0177	.0006	.0052
5-FAS 02 TANKS	.0014	.0051	.0049	9.	0 • ′	0.
MDA/STS/AM	.0001	.0419	.0000	.0104	0000	.0055
5-AM N2 TANKS	.0000	.0007	.0003	0.	0.	0.
COMMAND/SERVICE 400.	.0000	.1180	.0000	.0342	6000	.0047
DEPLOYMENT ASSEMBLY	.0015	.0058	.0031	0.	0.	0 •
ATM-RACK, CMGS, 4-SAS	.1007	.3191	.1737	.0311	0000	.0004
ATM-SPAR CENTER	.0000	.0007	0000	.0437	0000	0.
ATM-GRAZCAN CENTER	.0000	.0302	0000	.0554	.0003	.0585
			***	***		
SUM	.1041	.5049	. 1839	.1224	.0003	.0345

BR/OWS SKIRT/IU/FAS	. 1383
6-FAS 02 TANKS	.0114
MD4/STS/AM	.0430
6-AM N2 TANKS	.0011
COMMAND/SERVICE MOD.	1270
DEPLOYMENT ASSEMBLY	.0133
AT4-RACK, CMGS, 4-SAS	.5949
ATH-SPAR CENTER	.04+5
AT4-GRA/CAN CENTER	. 1245

C-19 TABLE C-16

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

·	ANA	LYTICAL	MODE 1	. برد د	FREQU	ENCY= 4	+. 32 4Z.
NODE NO.	GMC (DX)	GMC (DY)	GMC (DZ)	GMC (TX)	3 MC (TY)	GMC (TZ)	NODE Description
				•	_ 0000	0072	DACE DUCADUS SYTDY
1	.0000	.0112	•0000	.0094	0000		BASE RNG/OWS SKIRT OWS/IU INTERFACE
2	. 1000	.0005	0000	.0031	.0000		IU/FAS INTERFACE
3.	.0000	.0001	.0000	.0052			
4	.0007	.0005	•0012	0 • 0 •	0.	0 • 0 •	FAS 02 B)TL1,+Y +Z FAS 02 B)TL2,+Y +Z
5 6	.0001	.0020	•0005		0.	0.	FAS 02 BOTL3,-Y +Z
	0000	.0019	.0003	0.	0.	0.	FAS 02 B3TL4,-Y +Z
7 8	.0004	.0004	.0009	0.	0.	3.	FAS 32 B3TL5,-Y -Z
9	.0003	.0003	•0020	0 • 0 •	0.	0.	FAS 02 BOTUS, -Y -Z
16	.0000	.0000	.0001	0.	0.	0.	FAS/AM/DA IF, +Y
11		.0012	•0000	0.	0.		FAS/AM/DA IF, +Z
	.0000	.0000	.0008	0.	0.		FAS/4M/04 IF, -Y
12	.0002 0000	.0000	.0004	0 •	0.		FAS/DA IF, -Y -Z
13	.0000	.0002	.0000	0.	0.	0.	FAS/AM IF, -Z
14 15	.0000	0000	.0000	0.	0.		FAS/DA IF, +Y -Z
15	.0000	.0000	.0000	.0062			AM TUNNEL/SHEAR WB
17	.0000	.0001		.0002	•000G		AM TUNNEL/STS IF
18	.0000	.0001	40000	.0000	3030		MDA/STS INTERFACE
19	.0000	.0333	.0000	0001	0000		MDA CONE/CYL ITRFC
20	.0000	0000	.0002	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0000	•0000	,0002	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0003	.0002	0.	0.	8.	N2 TANK, +Z, LOWER
23	.0000	.0002	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0002	.0000	0.	0.	0.	NZ TANK -Z, LOWER
25	.0000	.0001	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0000	.0484	0000	.C005	0000		CH, FHD BULKHEAD
27	.0000	.0287	.0000	.0008	.0000	0003	•
28	0000	.0118	0000	.0011	.0000		SH. FHD BULKHEAD
59	0000	.0291	.0000	.0018	0000		SM, AFT BULKHEAD
30	.0000	.0050	.0000	0.	0.	0.	LOWER D LATCH, DA
31	.0008	.0003	.0016	0.	0.	0.	LOWER +Y TRUNNION
32	.0005		.0015	0.	0.	0.	LOHER -Y TRUNNION
33	.0000	.9006	.0000	0.	8.	0.	EREP PACKAGE C.G.
34	.0003	.0147	.0025	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	.0180	.0003	.0435	0.	0.	0.	ATH PN 4,5 IF, OUTR
36	.0186	·0035	.0342	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0052	.0226	.0045	0.	0.	0.	ATH PN 2,3 IF, OUTR
38	.9127	.1814	.0045	0 •	0.	0.	ATM PN 6,7 IF, INNR
39	.0166	.0354	.0187	0 •	0.	0.	ATH PN 4,5 IF, INNR
40	.0113	.0075	.0308	0.	0.	0.	ATH PN 8,1 IF, INNR
41	0015	.0249	.0049	0 •	0.	0.	ATM PN 2,3 IF, INNR
42	.0043	.0101	0171	.0002	0000	.0001	•
43	.0072	.0100	.0148	.0006	0000	.0002	
44	.0001	.0017	.0001	.0003	•000G	.0002	
45	.0019	.0019	0.	0.	0.	0.	ATM SAS , PN 1
46	.0016	.0016	0.	0.	0.	0.	ATH SAS, PN 3
47.	.0019	.0019	0.	0 •	0.	0.	ATH SAS, PN 5
48	.0014	.0014	0.	0.	0.	0.	ATM SAS, PN 7
49	.0000	.0007	0000	.0437	0000	0.	SPAR CENTER
50	.0000	.0002	0000	.0554	.0003		GRAZCAN CENTER

. 1224

1839

SUM

.0013

.0845

TABLE C-17

DRBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 15

ANALYTICAL FREQUENCY = 4.868 HZ.

•						•
COMPONENT '	GMC	GMC	GMC	GYC	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(LX)	(TY)	(TZ)
RP/OWS SKIRT/IU/FAS	.0027	.0004	.0069	.0300	.0056	.0002
5-FAS OZ TANKS	.0027	. 3005	.0041	0.	0.	0.
MOAISTSIAM	.0030	.0004	.0113	.0000	.0034	.0001
6-AM N2 TANKS	.0005	.0000	.0007	0.	0.	0.
COMMAND/SERVICE 400.	.0066	.0012	0451	.0381	.0010	.0001
DEPLOYMENT ASSEMBLY	.0012	.0181	.0328	0.	0.	0.
ATM-RACK, CMGS, 4-SAS	.3376	.0134	• 3322	.0000	.0022	0000
ATM-SPAR CENTER	.0008	.0000	.0002	0300	.0674	3.
ATM-GRAZCAN CENTER	.0012	.0000	.0002	0000	.0958	.0001
,						
SUM	.3563	.0341	• 4335	.0001	.1755	.0004

BR/OWS SKIRT/IU/FAS	. 1158
6-FAS 02 TANKS	.0072
MDA/STS/AM	.0131
6-AM N2 TANKS	.0013
COMMAND/SERVICE MOD.	. 05+2
DEPLOYMENT ASSEMBLY	.0522
ATM-RACK, CMGS, 4-SAS	.6855
AT1-SPAR CENTER	. 0634
ATM-GRAZCAN CENTER	.0973

C-21 TABLE C-18

FREQUENCY= 4.87 HZ.

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 15

					, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
16E-5-7 -	•			•			
JOCH.	GMC	GMC	GMC	GMC	SMC	GMC	NODE
NO.	(DX)	(DA)	(DZ)	(XX)	(TY)	(TZ)	DESCRIPTION
1	.0010	.0002	0052	.0000	.0332	.0001	BASE RNG/OWS SKIRT
2 3	.0004	.0000	0000	.0000 .0000	.0007 .0017		OWS/IU INTERFACE IU/FAS INTERFACE
	.0000	.0000	.0002	0.	9011	0.	FAS 02 BOTL1,+Y +Z
5	.0001	.0001	.0005	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	.0000	.0000	.0007	0.	0.	0.	FAS 02 BOTL3, -Y +Z
7	.0002	.0000	.0011	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0007	.0000	.0007	0 •	0.	0.	FAS 02 BOTL5, -Y -Z
9	.0017	.0003	.0082	0 •	0.	C .	FAS 02 BOTL6, -Y -Z
10	.0001	0000	.0003	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0002	.0000	.0003	0.	0.	0 •	FAS/AM/DA IF, +Z
. 12	.0003	.0000	.0005	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0000	.0001	.0002	0.	Ü•	C.	FAS/DA IF, -Y -Z
14	.0004	• 0 0 0 0	.0001	0 •	0.	G •	FAS/AM IF, -Z
15	.0001	.0000	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0004	.0000	.0006	0000	0008		AM TUNNE_/SHEAR WB
17	.0005	.0000 .0000	•0009 •0005	.0000 .0000	.0004 .0021	.0000	
18 19	.0010	.0003	.0093	.0000	.0009	.0001	
50	.0001	.0000	.0002	0.	_	0.	N2 TANK, +Y, LOWER
21	.0001	.0000	.0002	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0000	.0001	0.	0.	0.	NZ TANK, +Z, LOWER
23	.0.000	.0000	.0001	0.	Ö.	0.	NZ TANK, +Z, UPPER
24	.0002	.0000	.0001	0.	0.	Ġ.	NE TANK -Z, LOWER
25	.0032	.0000	.0001	0.	- O •	8.	N2 TANK, -Z, UPPER
25	.0011	.0005	.0175		0000	0000	
27	. Ú 015	.0003	.0123	.0000	0301	0000	•
5.8	.0017	.0002	.0047	.0001	• 0 0 0 th	.0001	
29	.0022	.0003	.0106	0000	.0008		SM, AFT BULKHEAD
30	.0011	.0000	.0196	0 •	0. •	0.	LOHER D LATCH, DA
31	0000	.0083	.0039	6 •		8.	LOWER +Y TRUNNION
32 33	.0001 .0003	.0097 .0000	.0043	0.	0.	0.	LOWER -Y TRUNNION EREP PACKAGE C.G.
34	.0019	.0007	.0695	0.	0.	0. G.	ATH PN 6,7 IF, OUTR
3 4 35	.0007	.0001	.0051	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0056	.0003	.0117	0.	0.	0.	ATM PN 8,1 IF OUTR
37	.0051	0003	.0856	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0324	0020	.0507	0.	0.	0.	ATM PN 6,7 IF, INNR
39	. 1795	0012	.0008	0 .	0 •	0.	ATH PN 4,5 IF, INNR
40	.1934	.0058	.0114	0.	0 •	0.	ATM PN 8,1 IF, INNR
41	.0672	.0004	.0714	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0147	.0001	0000	.0000	0007	0000	
43	.0122	.0002	.0001	.0000	.0007	0000	CMG, TY SIDE
44	.9146	.0001	.0250	•0000	.0008	0000	CMG, +X SIDE
45	.0023	.0023	0.	0.	0.	0.	ATM SAS , PN 1
46 47	.0026	.0026	0.	0.	0.	0.	ATM SAS, PN 3
47 48	.0021 .0023	.0021 .0023	0 •	0 .	0 •	8.	ATM SAS, PN 5
49	.0008	.0000	.0002	0000	0. .0574	0. 0.	ATM SAS, PN 7 Spar center
50	.0012	.0000	.0002	0000	.0358		GRAZCAN CENTER
		~~~~	~~~~	5 C C C C	00920	00007	SKALOWIA DEIMITA
SUM	.3563	.0341	. 4335	.0001		.0004	

# ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

# ANALYTICAL MODE 18 ANALYTICAL FREQUENCY = 5.706 HZ.

COMPONENT	GMC	GMC	GMC	GHC	GMC	G4C
NAME	(DX)	(DY)	(02)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.0099	. 4988	.0002	.0335	.0001	• û 596
5-FAS 02 TANKS	.0200	.0601	.0923	0.	0.	0.
MDA/STS/AM	.0003	.0587	.0000	.0014	0000	.0120
5-AM N2 TANKS	.0004	.0175	.0001	0.	0 •	0.
COMMAND/SERVICE 400.	.0002	.2062	.0002	.0020	.0001	.0071
DEPLOYMENT ASSEMBLY	.0117	.0820	.0002	0 •	o •	0.
ATM-PACK, CMGS, 4-SAS	.0497	.0443	0000	.0000	0000	.0002
ATM-SPAR CENTER	.0006	.0003	0000	.0300	.0001	0.
ATM-GRAZCAN CENTER	.0005	.0004	0000	.0000	.0001	.2392
SUM	.0934	.5683	.0030	.0169	.0003	.3281

BRYOWS SKIRT/IU/FAS	.1821
6-FAS 02 TANKS	.0824
MD4/STS/AM	.0724
6-AM N2 TANKS	.0131
COMMAND/SERVICE MOD.	. 2158
DEPLOYMENT ASSEMBLY	.1939
AT4-RACK, CMGS, 4-SAS	.0942
ATM-SPAR CENTER	.0009
ATM-GRA/CAN CENTER	. 2402

#### GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE FREQUENCY= 18 5.71 HZ. NOTE GMC GMC GM C GMC SMC GMC NODE NO. (DX) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION .0001 .0768 .0003 .0020 .0001 .0407 BASE RNG/OWS SKIRT 1 .0000 .0006 .0086 OWS/IU INTERFACE 2 -.0003 -.0000 .0000 3 -.0000 .0009 -.0000 .0025 .000C .0203 IU/FAS INTERFACE .0001 0. .0060 .0078 0. FAS 02 BOTL1,+Y +Z 4 0. 5 .0000 .0014 .0084 0. 0. 0. FAS DE BOTLE,+Y .0076 5 .0012 .0000 0. 0. 0. FAS 02 BOTL3,-Y +Z .0031 7 .0054 .0073 0 . 0. FAS 22 BOTL4.-Y +Z 0. 8 .0048 .0124 .0014 0. 0. 0. FAS 02 BITL5,-Y -Z 9 .0008 0. FAS 32 BOTL6,-Y -Z .0013 .0166 0. Û. .0000 0. 13 .0043 .0036 0. FAS/AM/DA IF. +Y 0. .0000 FAS/AM/DA IF, +Z .0000 .0044 0. 0. 11 0. .0000 12 .0049 .0053 0. 0. 0. FAS/AM/DA IF, -Y FAS/DA IF, 13 .0001 .0022 -.0001 0. 0 . 0. -Y -7 .0000 .0030 -.0000 0. FAS/AM IF. - Z 14 0. 0. .0005 .0009 -.0000 FAS/DA IF, AY -Z 15 0. 0. 0. .0000 .0000 .0118 .0001 16 .0000 .0000 AM TUNNE_/SHEAR WB .0000 17 .0001 .0203 .0002 .0000 .0033 AM TUNNEL/STS IF -.0014 .0063 MOA/STS INTERFACE 18 .0000 .0004 -.0000 .0001 -.0000 19 .0001 .0279 .0006 -.0000 .0024 MDA CONE/CYL ITRFC .0000 .0002 .0022 a. 0. N2 TANK, +Y, LOWER 20 8. 21 .0003 .0025 .0000 0. 0. N2 TANK, +Y, UPPER ũ. .0028 .0000 0. 0. N2 TANK, +Z, LOWER 22 .0000 0. .0000 N2 TANK, +Z, UPPER .0000 .0030 0. 0. ů. 23 N2 TANK 24 .0000 .0032 .0000 0. 0. 0 。 -Z, LOWER .0000 .0039 .0000 0. 0. N2 TANK, -Z, UPPER 25 J. 25 .0001 .0768 .0000 -.0001 -.0000 .0001 CM, FWD BULKHEAD 27 .0001 .0639 .0001 = .0002 10000 = .0004 CM, AFT BULKHEAD 28 -.9001 .0234 .0000 .0009 -.0000 .0014 SM, FWD BULKHEAD 29 -.0000 .0421 .0000 .0014 .0001 .0060 SM, AFT BULKHEAD 30 .0000 .0352 .0000 0. 0. LOHER D LATCH, DA 0 . .0037 .0053 -.0000 Ú. LOWER +Y TRUNNION 31 0. 0. LOWER -Y TRUNNION .0000 0. .0054 .0029 0. 32 0. 0. EREP PACKAGE C.G. 33 .0000 .0402 .0002 0. 0. .0008 .9078 .0000 0. 34 0. ATM PN 6,7 IF, OUTR 0. ATM PN 4,5 IF, OUTR 35 .0101 .0006 -.0001 0. 0. 0. 0. 36 .0089 .0012 -.0000 ATM PN 8,1 IF, OUTR 0. C. 37 ATM PN 2,3 IF, OUTR .0029 .0108 .0000 0. 0. 0. G. 38 .0010 .0104 -.0000 ATM PN 6.7 IF, INNR a. 0. 0. 0. 39 .0090 .0007 -.0000 0. ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR 0. 40 . 1086 .0014 .0000 0. C. 41 0. .0024 .0086 -.0000 ATM PN 2,3 IF, INNR 0. ٥. CMG, -Y SIDE .0000 42 .0032 -.0000 .0000 .0000 -.0000 .0000 -.0000 -.6000 .0001 43 .0028 -.0000 CMG, +Y SIDE .0000 44 .0000 .0026 -.0000 -.0000 .0001 CMG, +X SIDE 45 0. 0 . 0. 0. ATH SAS , PN 1 .0000 .0000 0. 0. ATH SAS, PN 3 45 .0000 .0000 0. 0. 47 .0000 .0000 0. ATM SAS, PN 5 0. 0. 0. 0. 0. 0. 48 .0000 .0000 ATM SAS, PN 0. .0003 -.0000 .0000 0. 49 .0006 .0001 SPAR CENTER 50 .0005 .0004 -.0000 .0000 .0001 .2392 GRA/CAN CENTER

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.0033

.3281

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.0069

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.0030

SJM

. 8934

.5683

TABLE C-21

# ORBITAL CONFIGURATION-MODAL SURVEY ANALYTICAL 10DES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 21

ANALYTICAL FREQUENCY = 6.552 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GAC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
AP/OWS SKIRT/IU/FAS	.0081	.0005	.1849	.0016	.1203	.0000
5-FAS 02 TANKS	.0370	.0156	.1307	0.	0.	Э.
MDA/STS/AM	.0004	.0003	<ul><li>10 37</li></ul>	.0007	.0130	.0001
6-AM N2 TANKS	.0011	.0003	. 1457	0.	'O.	<b>3</b> •
COMMAND/SERVICE MOD.	.0004	. 3002	. 1644	0000	.0036	0000
DEPLOYMENT ASSEMBLY	.0172	.0184	.0416	0.	0.	0.
ATM-RACK, CMGS, 4-SIS	.0195	.0029	.0451	.0000	.0001	.0330
ATM-SPAR CENTER	.0007	GO O O	.0061	.0300	.0035	0.
ATM-GRA/CAN CENTER	.0008	.0000	.0053	0000	.0050	.0000
				***		
SUM	.0852	.0383	.7285	.0123	. 1456	.0001

BRIOWS SKIRT/IJ/FAS	.3156
6-FAS OZ TANKS	.1833
MD4/STS/AM	.1131
6-4M N2 TANKS	.0471
COMMAND/SERVICE MOD.	.1686
DEPLOYMENT ASSEMBLY	.0772
AT4-RACK, CMGS, 4-SAS	.0696
AT4-SPAR CENTER	.0103
ATM-GRA/CAN CENTER	.0111

C-25 TABLE C-22

### GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

w· ·	AN(	ALYTICAL	MODE 2	1	FREQUI	ENCY= 6	.55 12.
NODE	GMC	GMC	GM C	GMC	SMC	GMC	NODE
NO.	(XC)	(DA)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0000	.1533	.0010	.0711		BASE RNG/OWS SKIRT
2	0000	.9001	.0002	• 0 0 G 3	.0150		OWS/IU INTERFACE
3	.0000	.0001	.0030	.0004	.0342		IU/FAS INTERFACE
4	.0045	.0013	.0271	0.	0.	0.	FAS 02 B3TL1,+Y +Z
5	.0977	.0043	.0257	0.	0.	0 •	FAS 02 B3TL2,+Y +Z
5	.0078	.0051	.0227	0.	0.	D •	FAS D2 BOTL3,-Y +Z
7	.0043	.0019	.0178	0.	0 •		FAS 02 BITL4,-Y +Z
8	.0053	.0008	.0156	0.		0.	FAS 02 B)TL5,-Y -Z
9	.0074	.0021	.0208	0.	3.	0.	FAS 02 BOTL5,-Y -Z
10	.0001	0000	.0056	0.	0 •	0 .	FAS/AM/DA IF, +Y
11	.0040	0000	.0099	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0002	.0001	.0050	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0002	0000	.0009	0.	0 •		FAS/DA [F, -Y -Z
14	.0033	.0004	.0052	0.	0.	0 •	FAS/AM IF, -Z
15	.0004	0000	.0008	0.	0 •	0.	FAS/DA IF, +Y -Z
15	.0000	.0001	.0298	.0001	.0001	.0000	
17	.0000	.0001	.0530	.0002	.0037		AM TUNNE /STS IF
18	.0001	.0000	.0139	.0002	.0030		MDA/STS INTERFACE
19	.0002	.0001	.0071	•0003	.0051	.0000	
23	.0000	.0000	.0081	0.	0.	<b>(</b> •	N2 TANK, +Y, LOWER
21	.0000	.0000	.0096	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0001	.0000	.0059	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0002	.0000	.0079	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0004	.0001	0060	0.	0.	0.	N2 TANK -Z, LOWER
25	.0004	.0001	.0073	0.	0.	0	N2 TANK, -Z, UPPER
25 27	.0001 .0001	.0001 .0000	.0529 <u>-0608</u>	0000 0000	.0000 =.0034		CM, FWO BULKHEAD /
27			.0179		•031C		SM. FWD BULKHEAD
28 29	.0001	•0000	.0327	.0001 0001	.0328		SM, AFT BULKHEAD
30	.0002		.0005	0.	0.	0.	
31	.0002	.0084	.0009	0.	0.	0.	LOWER D LATCH, DA LOWER +Y TRUNNION
32	.0004	.0077	.0088	0.	0.	0.	LOWER -Y TRUNNION
33	.0166	.0023	.0234	0.	9.	0.	EREP PACKAGE C.G.
34	.0005	.0000	0000	0.	0.	0.	ATM PN 6,7 IF, OUTR
3 <b>5</b>	.0007	0000	.0005	0.	0.	0.	ATM PN 4,5 IF, OUTR
35	.0011	.0001	.0047	0.	0.	0.	ATH PN 8,1 IF, OUTR
3.7	.0012	0001	.0157	0.	0.	0.	ATM PN 2,3 IF, OUTR
3,1 38	.0009	.0000	0000	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0038	0002	.0004	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0037	.0013	.0039	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0041	0001	.0141	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0005	.0001	.0008	.0000	.0000	.0000	CMG, -Y SIDE
43	.0005	.0001	.0004	.0000	.0000	.0000	
44	.0008	0000	.004 Ż	.0000	.0001	.0000	
45	.0007	.0007	0.	0.	^	0.	ATM SAS ,PN 1
46	.0009	.0009	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
49	.0007	0000	.0061	.0000	.0035	0.	SPAR CENTER
50	.0008	.0000	.0053	0000	.0350		GRAZCAN SENTER

.0383

.7285

.0023

.1456

.0001

.0852

# ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL 10DES GENERALIZED HASS CONTRIBUTION SUMMARY

# ANALYTICAL MODE 28 ANALYTICAL FREQUENCY = 9.192 HZ.

COMPONENT	GMC	GMC	GM C .	GYC	GMC	GHC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRT/IU/FAS	.0004	.0089	.0138	.0304	.0055	.0315
5-FAS 02 TANKS	.0178	.4652	. 4440	0.	0.	0.
MDA/STS/AM	.0000	.0844	.0073	.0009	.0004	.0002
6-AM N2 TANKS	.0018	.0016	.0075	0 •	0.	0.
COMMAND/SERVICE 40D.	.0002	.0000	.0000	.0001	.0000	.0000
DEPLOYMENT ASSEMBLY	.0013	.0059	. 00 35	0 •	0.	0.
ATM-PACK, CMGS, 4-545	.0031	.0024	.0013	-0000	.0000	.0000
ATM-SPAR CENTER	.0000	.0001	.0001	.0302	.0001	0.
ATM-GRAZCAN CENTER	.0000	.0001	.0001	.0002	.0001	.0000
			***			
SUM'	.0237	.4885	.4779	.0319	.0061	.0019

BRIOWS SKIRT/IJ/FAS (	.0316
6-FAS 02 TANKS	.9270
MD4/STS/AM	.0133
6-AM N2 TANKS	. 3132
CO4MAND/SERVICE MOD.	0003
DEPLOYMENT ASSEMBLY	.01)8
ATM-RACK, CMGS, +-SAS	.0058
AT4-SPAR CENTER	.0005
ATY-GRAZCAN CENTER	.0015

C-27 TABLE C-24

#### GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

FREQUENCY= 9.19 42. ANALYTICAL MODE GMC GMC GMC GMC SMC GMC MODE NODE (XC) (DZ) (TX) (TY) (TZ) DESCRIPTION NO. (DY) .0000 .0001 .0004 .0003 .0123 .0006 BASE RNG/OWS SKIRT. 1 .0002 .0000 OWS/IU INTERFACE .0000 2 .0000 .0005 .0007 .0010 IU/FAS INTERFACE 3 .0000 .0022 .0039 .0001 .0029 FAS .02 B)TL1,+Y +Z 0. 0. 4 .0053 .0004 . .0007 0. 0. 5 FAS D2 BOTL2, +Y +Z .0056 .0521 .0235 0. 0. 0. 5 .0393 0. 0. FAS 02 BOTL3,-Y +Z .0004 .3625 7 0. FAS 02 BOTL4, -Y +Z .3756 .0007 .0431 0. 0. FAS 32 BOTL5, -Y -Z .0022 .0066 0. 8 .0046 0. 0. 0. 0. FAS 32 BOTL6, -Y -Z 9 .0036 .0004 .0003 0. .0. FAS/AM/DA IF, +Y .0004 -.0000 .0024 0. 0. 10 0. FAS/4M/D4 IF, +Z 11 -.0002 .0020 .0045 0. 0. FAS/AM/DA IF, -Y .0015 12 -.0002 .0031 0. 0. 0. .0. FAS/DA IF, -Y -Z .0000 .0002 -.0000 0. 0. 13 FAS/AM I=, .0006 .0000 0. 0. 0. - Z 14 .0003 0. 15 8. FAS/DA IF, +Y -Z .0001 .0003 .0004 0. .0001 AM TUNNE_/SHEAR WB 15 .0000 .0023 .0041 .0000 .0003 .0003 .3002 .0001 AM TUNNEL/STS IF 17 .0000 .0011 .0015 -.0001 -. 0001 MDA/STS INTERFACE 18 .0003 .0000 .0010 .0015 .0003 .0001 MDA CONE/CYL ITRFC 19 .0000 .0001 .0001 .0001 .0009 0. 0. 0. N2 TANK, +Y, LOWER 20 .0001 .0000 N2 TANK, +Y, UPPER .0004 0. 0. 21 .0001 .0000 0. N2 TANK, +Z, LOWER 22 .0002 .0000 .0039 0. 0. 0. N2 TANK, +Z, UPPER 23 0. .0002 .0000 .0024 0. 0. N2 TANK -Z, LOWER 24 0. 0. .0002 .0001 .0010 0. N2 TANK, -Z, UPPER .0002 .0002 .0003 25 O. 0. 0. .0000 .0000 -. COOO CM, FWD BULKHEAD .0000 .0000 .0000 26 0000 -. 0000 CM, AFT BULKHEAD 27 .0000 -0000 0000 <u>-0000</u> 28 .0000 .0000 -.0000 .0000 SM, FHO BULKHEAD .0000 .0000 .0001 .0000 .0000 SM, AFT BULKHEAD 29 .0001 .0000 .0000 .0001 .0017 .0002 0. 0. LOWER D _ATCH, DA 30 0. 0. 0. 0. LOWER +Y TRUNNION .0004 .0037 31 .0026 0. 0. LOWER -Y TRUNNION .0003 .0000 .0008 0. 32 EREP PACKAGE C.G. 33 .0005 .0005 .0000 0. 0. 0. ATM PN 6,7 IF, OUTR ATM PN 4,5 IF, OUTR 74 .0000 .0001 -.0000 0. 0. 0. -35 .0001 0. 0. .0000 .0001 0. 0. 0. ATM PN 8,1 IF, OUTR 36 .0000 .0000 ..0002 0. ATM PN 2,3 IF, OUTR 0. 0. 37 .0001 .0003 .0000 0. ATH PN 6,7 IF, INNR ATH PN 4,5 IF, INNR .0001 .0000 38 .0002 0. 0. Ù. 0. 39 .0000 .0000 0. 0. .3001 0. ATM PN 8,1 IF, INNR .0002 40 .0003 -.0000 0. 0. 0. ATH PN 2,3 IF, INNR 41 .0304 .0002 •0003 0. 0. CMG, -Y SIDE 42 .0000 .0001 .0000 .0000 .0000 -.0000 .0000 -.0000 .0000 43 .0001 .0000 .0000 CMG, +Y SIDE -.0000 .0000 .0000 CMG, +X SIDE 44 .0001 .0000 .0002 0. ATM SAS , PN 1 0. 45 C. .0613 .0013 0. ATM SAS, PN 3 .0000 0. 45 .0000 0. 0. 0. ATM SAS, PN 5 0 • . 0. .0004 0. 47 .0004 0. 0. 7 ATM SAS, PN 7 48 .0001 .0001 0. 0. .0001 49 .0000 .0001 .0001 .0002 0. SPAR CENTER 50 .0002 .0001 .0000 GRA/CAN CENTER .0000 .0001 .0001 --------

.4885

. 4779

.0019

.0051

.0019

.0237

SUM

# ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

# ANALYTICAL MODE 30 ANALYTICAL FREQUENCY = 9.405 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GHC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.1688	.0023	.0021	.0000	.0003	.0001
5-FAS OZ TANKS	.1842	.0154	.0161	0.	0.	0.
MD A/STS/AM	.0089	.0009	.0008	0000	0000	0000
5-AM N2 TANKS	.0019	.0006	.0025	0.	0.	0.
COMMAND/SERVICE MOD.	•5696	.0004	.0000	.0000	.0002	.0001
DEPLOYMENT ASSEMBLY	.0148	.0003	.0011	0.	0 •	0.
ATM-PACK, CMGS, 4-SAS	.0022	.0011	.0006	.0300	.0000	.0000
ATM-SPAR CENTER	.0001	.0001	.0000	.0388	.0002	0.
ATH-GRA/CAN CENTER	.0001	.0001	.0000	.0300	.0003	.0035
		~~~~	-00			
SUM	.9506	.0212	.0235	.0300	.0011	.0035

BR/OWS SKIRT/IJ/FAS	.1737
6-FAS 02 TANKS	.2157
MD4/STS/AM	. 1116
6-4M N2 TANKS	.0052
COMMAND/SERVICE MOD.	.5703
DEPLOYMENT ASSEMBLY	.0152
ATM-RACK, CMGS, 4-SAS	.0039
ATM-SPAR CENTER	.0034
AT4-GRA/CAN CENTER	.0040

C-29 TABLE C-26

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 3)

FREQUENCY= 9.41 47.

NODE	GHC	GMC	· GM C	GMC	GMC	GMC	NOJE
NO.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1100	, 54,	(0.7					
1	.0834	.0012	.0016	.0000	.0001	.0001	
2	.0241	.0001	.0000	.0000	.0001		
3	.0410	.0001	.0000	0000	.0001		IU/FAS INTERFACE
4	.0321	.0021	.0105	0.	0 .	0.	FAS 02 BOTL1,+Y +Z
5	.0347	.0066	.0006	0.	0.	G •	FAS 32 BOTL2,+Y +Z
5	•0252	.0003	0000	0.	0.	0 •	FAS 02 BOTL3, -Y +Z
7	.0292	.0004	.0017	0.	0 .	0 •	FAS 02 BOTL4,-Y +Z
8	. 9 345	0000	.0014	0.	0.	0 •	FAS 02 BOTL5, -Y -Z
9	.0284	.0060	.0019	0 •	0 •	0.	FAS 02 BOTL6, -Y -Z
10	.0038	.0000	.0000	0 •	0.	0 •	FAS/AM/DA IF, +Y
11	.0054	.0000	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0857	.0001	0000	0.	0.	C .	FAS/AM/DA IF, -Y
13	.0014	.0007	.0004	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0027	.0000	.0000	0.	0.	0.	FAS/AM IF, -Z
15	.0012	.0000	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0000	.0001	.0002	.0000	.0000		AM TUNNEL/SHEAR WB
17	.0013	.0002	.0001	.0000	.0000		AM TUNNEL/STS IF
18	.0035	.0004	.0003	0000	0000		MDA/STS INTERFACE
19	.0039	.0003	•000Z	0000	0000	0000	_
50	.0002	.0003	.0001	0.	0 •	0.	N2 TANK, +Y, LOWER
21	.0004		.0000	0.	0.	0.	NZ TANK, +Y, UPPER
22	.0002	.0000	.0012	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0034	.0000	.0010	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0004	.0000	.0002	0. •		·· O •	N2 TANK -Z, LOWER
25	.0005	.0000	.0002	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0780	.0000	0000	.0000	.0001		CM, FWD BULKHEAD
27	.1293	.0001	0000	.0000	.0001	.0001	
2.8	.1477	.0000	.0000	0000	0000	0002	
29	.2146	.0002	.0000	0000	.0000	0001	·
30	.0353	.0003	.0002	0.	0.	0.	LOWER D LATCH, DA
31	.0035	0001	.0003	0.	0.	0.	LOWER +Y TRUNNION
32	.0027	.0000	.0002	0.	0.	0.	LOWER -Y TRUNNION
33	.0023	.0000	.0003	0.	0.	0 •	EREP PACKAGE C.G.
34	.0000	.0001	.0002	0.	0.	0.	ATM PN 6,7 IF, OUTR
35 36	.0000	.0000	0000	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	.0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0000	.0000	.0001	0.	0. 0.	0. 0.	ATM PN 2,3 IF, OUTR
38 39	.0001 .0001	0000.	.0002 .0000	0 。 0 •	0.	0 • 9 •	ATM PN 6,7 IF, INNR ATM PN 4,5 IF, INNR
40	.0001	.0000	.0000		0.	0.	
41	.0002	0000	.0001	0 . 0 .	0.	0.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	.0002	.0000	.0001	.0000	.0000	.0000	
43	.0001	0000		.0000	.0000	.0000	· · · · · · · · · · · · · · · · · · ·
44	.0001	.0000	.0000	.0000	.0000	.0003	
45	.0002	.0002	0.	0.	0.	3.	ATM SAS , PN 1
46	.0002	.0001	0.	0.	0.	0.	ATM SAS, PN 3
47	.0004	.0004	0.	0.	0.	0.	ATH SAS, PN 5
48	.0003	.0003	0.	0.	0.	0.	ATM SAS, PN 7
49	.0001	.0001	.0000	.0000	.0002	0.	SPAR CENTER
50	.0001	.0001	.0000	.0000	.0003	.0035	
- •			2000	***		0000	Control of the Contro
SUM	. 95 05	.0212	.0235	.0000	.0011	.0036	

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 38 ANALYTICAL FREQUENCY = 12.072 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GYC
NAME	(xa)	(DY)	(DZ)	(TX)	(TY)	(TZ)
9º/OWS SKIRT/IU/FAS	.0004	.0194	.0178	.1245	.0001	.0003
5-FAS 02 TANKS	.0316	.0314	. 2341	0 •	0.	0.
MPA/STS/AM	0000	.0106	.0005	.6156	0000	.0014
5-AM N2 TANKS	.0000	.0175	.0083	0.	0.	C •
COMMAND/SERVICE 400.	.0001	.0221	. 0905	.0702	.0000	.0008
DEPLOYMENT ASSEMBLY	.0001	.0315	.0004	3 •	0.	0 •
ATM-RACK, CMGS, 4-SAS	.0001	.0001	.0001	.0100	.0003	• C O O O
ATM-SPAR CENTER	.0000	.0008	.0000	.0001	.0000	0.
ATM-GRAZCAN CENTER	.0003	.0000	.0000	.0001	.0000	.0000
SUM	.0323	.1027	.0619	.8165	.0002	.0325

BR/OWS SKIRT/IJ/FAS	.1624
6-FAS 02 TANKS	.0971
MD4/STS/AM	.6132
6-AM N2 TANKS	.0258
CO4MAND/SERVICE MOD.	. 1938
DEPLOYMENT ASSEMBLY	.0021
ATM-RACK, CMGS, 4-SAS	.0033
ATY-SPAR CENTER	.0031
ATM+GRA/CAN CENTER	.0002

C-31 TABLE C-28

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 33 FREQUENCY= 12.07 HZ.

NODE	GMC	GMC	- GM C	GMC	3 MC	GMC	NODE
NO.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
			•				
1	.0000	.0061	. 0000	0769	.0000	.0001	BASE RNG/OWS SKIRT
2	.0000	0000	.0001	.0185	.000C		OWS/IU INTERFACE
3	0000	.0003	.0001	.0291	.0000		IU/FAS INTERFACE
4	.0052	.0007	.0037	0.	0.	0.	FAS 02 B)TL1,+Y +Z
5	.0047	.0070	.0140	0.	0.	0.	FAS 02 BOTL2,+Y +Z
6	.0063	.0038	.0052	0.	0.	0.	FAS 02 BOTL3, -Y +Z
7	.0050	.0039	.0041	0.	0.	0.	FAS 02 B)TL4,-Y +Z
8	.0047	.0131	0 05 0	0.		0.	FAS 02 BOTL5, -Y -Z
9	.0046	.0028	.0011	0.	0.	0.	FAS 32 B3TL6, -Y -Z
10	.0002	.0000	.0042	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0164	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
. 12	.0002	.0002	.0132	8.	0.	0.	FAS/AM/DA IF, -Y
13	.0002	0000	0001	0.	0.		FAS/DA IF, -Y -Z
14	0000	•0023	.0000	0.	0.	G.	FAS/AM IF, -Z
		.0001			0.		
	.0000		.0001 .0000	0.	-		
15	.0000	.0003		.0121	.0000		AM TUNNEL/SHEAR WB
17	.0000	.0002	.0000	.1454	.0300		AM TUNNEL/STS IF
18	.0000	.0022	.0003	.2420			MDA/STS INTERFACE
	/0000	.0080	0002	.2061	.0000		HDA CONE/CYL ITREC
20	.0000	.0003	¢0000	0.	0.	0.	N2 TANK, +Y, LOWER
21	0000	.0002	60082	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0015	. 0000	0.	0.	0 .	N2 TANK, +Z, LOWER
23	.0000	.0048(0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0002	.0000	0 •	0.	0.	N2 TANK -Z, LOWER
25	• 0 0 0 0	.0106	.0000	0 •	0.	0.	N2 TANK, -Z, UPPER
26	.0000	•0005	.0001	•0170	.000C		CM, FWD BULKHEAD
27	.0000	.0168	.0001	.0108		.0004	
28	.0000	.0015	0000	.0125		.0000	· — ·
29	.0000	.0032	• 0 00 4	.0298			SM, AFT BULKHEAD
30	.0001	.0005	.0001	0.	0.	0.	LOWER D .ATCH, DA
31	• 0 0 0 0	.0002	0002	0.	0.	٥.	LOWER +Y TRUNNION
32	.0000	0001	0005	0.	0.	0.	LOWER -Y TRUNNION
33	.0000	.0010	0000	0.	0 •	0.	EREP PACKAGE C.G.
34	.0000	.0000	0000	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	.0000	.0000	.0001	0.	0.	0.	ATM PN 4,5 IF, OUTR
35	.0000	.0000	.0000	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0000	.0000	.0000	0.	0 。 `	0.	ATM PN 2,3 IF, OUTR
38	.0000	.0000	.0000	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0000	.0000	.0000	0.	0.	g.	ATM PN 4,5 IF, INNR
40	.0000	0000	.0000	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0000	.0000	.0000	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0000	.0000	.0000	.0000	.0000	.0000	CMG, -Y SIDE
43	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0007	.0000	0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	0.	0.	0.	ATM SAS , PN 1
46	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	C.	ATH SAS, PN 7
49	.0000	.0000	.0000	.0001	.0000	Ó.	SPAR CENTER
50	.0000	.0000	.0000	.0001	.0000		GRAZCAN SENTER
, ,			***				Commonly Common
SUM	.0323	.1027	.0619	.8005	.0002	.0025	
JU:1	• U J & J	. 10 % 1	+ 00 T2		9 0005	• U U C D	

DRBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 39 ANALYTICAL FREQUENCY = 12.568 HZ.

				i.	
GMC	GMC	GMC	GAC	GMC	GYC
(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
.0109	.0771	. 0235	.0001	.0040	.0128
.0619	.0933	.1114	0.	0 •	0.
.0000	.0908	.0141	.0303	.0004	.0125
.0054	.3082	.0437	0.	0.	0.
.0000	.0060	.0012	.0003	.0001	.0003
.0107	.0868	.0153	0.	0 •	0.
.0039	.0015	.0034	.0300	.0001	.0000
.0004	.0005	0000	.0128	.0084	0.
.0004	0004	.0000	.0034	.0008	0000
.0946	.6546	.2126	.0069	.0058	.0156
	.0109 .0619 .0000 .0064 .0000 .0107 .0039 .0004	(DX) (DY) .0109 .0771 .0619 .0933 .0000 .0908 .0064 .3082 .0000 .0060 .0107 .0868 .0039 .0015 .0004 .0005	(OX) (DY) (DZ) .0109 .0771 .0235 .0619 .0933 .1114 .0000 .0908 .0141 .0064 .3082 .0437 .0000 .0060 .0012 .0107 .0868 .0153 .0039 .0015 .0034 .0004 .00050000	(DX) (DY) (DZ) (TX) .0109 .0771 .0235 .0001 .0619 .0933 .1114 00000 .0908 .0141 .0303 .0064 .3082 .0437 00000 .0060 .0012 .0003 .0107 .0868 .0153 00039 .0015 .0034 .0300 .0004 .00050000 .0328 .0004 .0004 .0000 .0034	(OX) (OY) (OZ) (TX) (TY) .0109 .0771 .0235 .0001 .0040 .0619 .0933 .1114 0. 00000 .0908 .0141 .0303 .0004 .0064 .3082 .0437 0. 00000 .0060 .0012 .0303 .0001 .0107 .0868 .0153 0. 00039 .0015 .0034 .0300 .0001 .0004 .00050000 .0328 .0004 .0004 .0004 .0000 .0034 .0008

BRIOWS SKIRT/IU/FAS	.1294
6-FAS 02 TANKS	. 2655
MDA/STS/AM	.1031
6-AM NZ TANKS	. 3533
COMMAND/SERVICE MOD.	.0078
DEPLOYMENT ASSEMBLY	.1129
AT4-RACK, CMGS, 4-SAS	.0038
ATM-SPAR CENTER	.0041
AT4-GRA/CAN CENTER	.0051

C-33 TABLE C-30

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 33 FREQUENCY= 12.57 4Z.

===				-			
NODE NO.	GMC (DX)	ĠMC (DY)	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	NODE Description
			`		•		
1	.0001	.0128		.0001	.0320		BASE RNG/OWS SKIRT
2	.0000	.0096	.0029	.0000	0000C		OHS/IU INTERFACE
3	0001	。9197	.0058	.0000	.0020		IU/FAS INTERFACE
4	.1166	.0050	.0024	0.	0 •	0.	FAS 02 BOTL1,+Y +Z
5	.0976	.0022	.0106	0.	0 .	0.	FAS 02 BOTL2,+Y +Z
6	0004	.0067	.0747	0.	0.	0.	FAS D2 BOTL3, -Y +Z
7	. 3046	.0784	.0056	0.	0.	0.	FAS 02 B)TL4,-Y +Z
. 8	.0182	.0024	0002	0 •	0.	0.	FAS 32 BOTL5,-Y -Z
9	.0152	•9065	0183	0 •	0.	8.	FAS DE BOTL6, -Y -Z
10	.0050	.0004	.0048	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0008	.0208	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	. 0 0 3 9	.0002	.0059	0.	0 •	0.	FAS/AM/DA IF, -Y
13	.0001	.0002	0003	0 •	0.	0.	FAS/DA IF, -Y -Z
14	.0004	.0100	.0004	. 0 •	0 •	0.	FAS/AM IF, -Z
15	.0005	。0034	.0014	0 •	0.	0.	FAS/DA [F, +Y -Z
15	. 2000	.0394	.0055	.0000	.G305	.0022	AM TUNNEL/SHEAR HB
17	.0000	.1163	.0019	.0002	.0002	.0016	AM TUNNEL/STS IF
18	.000	.9281	.0042	0000	0033	0021	MDA/STS INTERFACE
19	.0000	.0069	.0014	.0002	.0001	.0008	'MDA CONE/CYL ITRFC
20	.0011	.1861	.0001	0 •	0.	. 0 •	N2 TANK, +Y, LOHER
21	.0034	.1139	.0000	0.	0 .	0.	N2 TANK, +Y, UPPER
22	.0003	.0025	.0217	0.	0.	0	N2 TANK, +Z, LOWER
23	.0006	.0007	.0111	0.	0.	0.	N2 TANK, +Z, UPPER
24.	.0004	.0023	.0070	0.	0 •	0.	N2 TANK -Z, LOWER
25	.0005	.0026	.0038	0.	0.	0 .	N2 TANK, -Z, UPPER
25	. 3 0 0 0	0000	.0000	.0000	.0000		CM, FWO BULK-EAD
27	. 1000	.0050	.0010	.0001	.0000	.0001	
28	.0000	.0002	.0000	.0001	0000	.0000	•
29	.0000	.0008	.0001	.0001	.0000	.0000	
30	.0006	.0317	.0018	0.	0.	Ū •	LOHER D LATCH, DA
31	.0054	.0486	.0016	<u>0</u> • (0.	0.	LOWER +Y TRUNNION
32	.0039	.0058	.0119	0 •	0.	0.	LOWER -Y TRUNNION
33	.0009	.0009	.0000	0 •	0.	0.	EREP PACKAGE C.G.
34	.0000	.0003	0000	0 •	0 •	0.	ATM PN 6,7 IF, OUTR
35	.0005	0000	.0018	G •	0.	0.	ATM PN 4,5 IF, OUTR
35	0000	0000	.0002	0	0.	0.	ATM PN 8,1 IF, OUTR
37	.0003	.0001	.0000	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0002	.0002	•0000	0 •	0 •	0 •	ATM PN 6,7 IF, INNR
39	.0002	.0000	.0006	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0007	0000	.0001	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0010	.9805	.0000	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0000	.0003	.0005	.0000	.0000	.0000	
43	.0003	.0000	.0000	0000	.0000	.0000	
44 45	.0004 .0000	0000	.0001	.0000	•0000,	.0000	
46	.0000	.0000	0 •	0 •	0.	0.	ATM SAS PN 1
40 47	.0000	.0000	0 . 0 <i>.</i>	0. 0.	0 . 0 .	0. 0.	ATM SAS, PN 3
48	.0000	.0000	0.	0.	0 .	0.	ATM SAS, PN 5 / ATM SAS, PN 7
40	.0004	.0005	0000	.0028	.0004	0.	SPAR CENTER
50	.0004	.0004	.0000	.0026	.0008		GRAZCAN CENTER
- 13	***	an 40 an	****	***	***	- 0 0 0 0 0	OKAYSAN SENIER
SUM	.0946	.6546	. 2126	.0069	.0058	.0156	•

TABLE C-31

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 41 ANALYTICAL FREQUENCY = 13.323 HZ.

COMPONENT	GMC	GMC	GMC	640	GMC	GYO
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OHS SKIRT/IU/F4S	.0001	.0026	.0088	.0305	.0035	.0310
5-FAS 02 TANKS	.0041	.0062	.0030	0.	0.	0.
MDA/STS/AM	0000	.0804	.2239	.0311	.0257	.0080
5-AM N2 TANKS	.0005	.0555	. 1285	0.	3.	0.
COMMAND/SERVICE 400.	0000	.1048	. 3079	.0347	.0146	.0348
DEPLOYMENT ASSEMBLY	.0003	.0042	.0041	Ú.	0 •	0.
ATM-RACK, CMGS, 4-SAS	.0004	.0001	.0002	.0380	.0000	.0000
ATM-SPAR CENTER	.0000	.0000	.0000	.0301	.0000	υ.
ATM-GRA/CAN CENTER	.0001	.0000	.0000	.0001	.0003	.0003
SUM	.0054	. 2538	. 6766	.0165	.0438	.0139

BR/OWS SKIRT/IU/FAS	.0166
6-FAS OZ TANKS	.0133
MD'A/STS/AM	.3391
6-AM N2 TANKS	. 1845
COMMAND/SERVICE MOD.	. 4358
DEPLOYMENT ASSEMBLY	.0036
ATM-RACK, CMGS, 4-SAS	• 0037
AT4-SPAR CENTER	.0002
ATY-GRAZCAN CENTER	.0003

C-35 TABLE C-32

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 41

FREQUENCY= 13.32 4Z.

			•			*	
и о ое • ои	GMC (OX)	GMC (DY)	GMC (DZ)	GMC (TX)	SMC (TY)	GMC (TZ)	
	-						•
1	•0000	.0014	.0043	.0003	.0322		BASE RNG/OWS SKIRT
2	.0000	.0001	.0002	.0001	.0003		OWS/IU INTERFACE
3	0000	.0003	.0011	.5001	.0010		IU/FAS INTERFACE
, 4	.0004	.0004	.0001	0 •	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0005	.0003	•0002	0 •	0.	0.	FAS 02 BOTL2,+Y +Z
5	.3004	.0005	.0027	0 •	0.	0.	FAS 02 BJTL3, -Y +Z
7	0000	.0039	0000	0 •	0.	0.	FAS 32 B3TL4,-Y +Z
8	.0008	.0009	.0001	0 •	0.	0.	FAS 02 BOTL5, -Y -Z
9	.0019	.0003	.0000	0 •	0.	0.	FAS 02 BOTLE, -Y -Z
. 10	• 2000	.0001	.0006	0 •		0.	FAS/AM/DA IF, +Y
11	.0000	.0003	.0094	0.•	0.	0 •	FAS/AM/OA IF, +Z
12	0000	.0001	.0019	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0000	0000	.0000	0 •			FAS/DA IF, -Y -Z
14	.0000	.0003	.0001	0 •	0.	0.	FASZAM IF, -Z
15	.0000	.0001	0001	0.	0.		FAS/DA IF, +Y -Z
16	.0000	.0019	a 0 0 3 7	.0001	.0011		AM TUNNEL/SHEAR WB
17	.0000	.0000	0003	.0005	.0327		AM TUNNEL/STS IF
18	0000	.0223	.0702	0002	.0198		MDA/STS INTERFACE
. 19	0000	.0561	,1496	.0008	.0322		MOA CONE/CYL ITREC
20	.0000	•0,326	,0078	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0001	.0169	.0010	0 •	0.	0.	NZ TANK, +Y, UPPER
22	• 0 0 0 0	.0035	.0758	0 •	0.	0.	NE TANK, +Z, LOHER
23	• 1012	.9896	.0390	0.	0.	0.	NZ TANK, +Z, UPPER
24	.0001	.0017	.0036		0.	0.	NZ TANK -Z, LOHER
25	• 0000	.0001	.0004	0 •	0.	0.	NZ TANK, -Z, UPPER
25	3000	.0018	.0038	.0000			CM, FWD BULKHEAD
27	0000	.0906	.2644	.0020	.0185	.0027	
28 ·	.0000	.0018	.0053	.0013	.0000		SM, FWD BULKHEAD
29	• 0000	.3107	.0345	.0013	.0010		SM, AFT BULKHEAD
30	.0001	.0007	0004	0 •	٥.	0.	LOWER D LATCH, DA
31	.0001	.0030	.0012	0 •		0.	LOHER +Y TRUNNION
32	0000	.0005	.0026	0.	0.	0.	LOWER -Y TRUNNION
- 33	.0001	.0000	0000	0 •	0.	0.	EREP PACKAGE C.G.
34	.0000	.0000	0000	0 •	0 .	0.	ATM PN 5,7 IF, OUTR
35	.0000	.0000	.0001	0 •	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	.0000	0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	. 2000	.0000	.0000	0 •	0.	0.	ATM PN 2,3 IF, OUTR
38	.000	.0000	0000	0 •	0.	0.	ATM PN 6,7 IF, INNR
39	.0000	7888	• 0.00 0	0 •	0.	•. •	ATM PN 4,5 IF, INNR
41)	.0001	.0000	0000	0 •	0.	0.	ATM PN 8,1 IF, INNR
4,1	.0031	.000 O	.0000	0 •	0.	8.	ATM PN 2,3 IF, INNR
42	.0000	.0000	.0000	.0003	.0000	.0000	CMG, -Y SIDE
43	.0000	•0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0001	0000	0000	•0000		.0000	CMG, +X SIDE
45	.0000	.0000	0 •.	0 •	0.	0.	ATM SAS , PN 1
46	0000	0000	0.	0 •	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0 •	.0.	0	ATM SAS, PN 5
48	0000	0000	0.	0 •	0.	0.	ATM SAS, PN 7
49	.0000	.0000	.0000	.0001	.0000	0 •	SPAR CENTER
50	.0001	.0000×	.0080	.0001	.0000		GRAZCAN SENTER
	~ ~ ~ ~					varia da en	, ·
SUM	•0054	. 25 38	.6765	.0065	• 0438	.0139	. ,

TABLE C-33

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 45 ANALYTICAL FREQUENCY = 14.855 HZ.

COMPONENT	GMC	GMC	GMC	- G4C	GMC	GYO
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
92/085 SKIRT/IU/FAS	.0024	.0216	.0005	.0313	.0000	.0003
5-FAS 02 TANKS	.0078	.0061	.0100	0.	0.	0.
MDA/STS/AM	.0005	.1437	.0059	.0312	.0013	.0274
6-AM N2 TANKS	.0075	.5540	.0191	0.	0.	ð.
COMMAND/SERVICE 400.	.0005	. 0922	.0087	.0142	.0005	.0344
DEPLOYMENT ASSEMBLY	.0013	• û 3 3 8	.0024	, 8 •	0.	0 •
ATM-RACK, CMGS, 4-SAS	.0050	.0007	.0015	.0300	.0001	.0000
ATH-SPAR CENTER	.0008	.0008	0000	.0040	.0045	0.
ATH-GRA/CAN CENTER	.0010	.0006	.0000	.0149	.0071	.0001
SUM	.0269	. 8534	.0482	.0257	.0136	.0323

BR/OWS SKIRT/IU/FAS	.0251
6-FAS 02 TANKS	.0239
MD4/STS/AM	.1801
6-4M N2 TANKS	.5816
COMMAND/SERVICE MOD.	.1216
DEPLOYMENT ASSEMBLY	.0374
AT1-RACK, CMGS, 4-SAS	.0074
AT4-SPAR CENTER	.0101
AT1-GRA/CAN CENTER	.0138

C-37 TABLE C-34

SENFRALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

·	ANI	ALYTICAL	MODE 4	5	FREQU	ENCY= 14	6.85 1Z.
NODE NO.	GMC (DX)	GMC (DY)	GMC	GMC (TX)	3MC (TY)	GMC (TZ)	NOJE Description
•		0477	0.004	0.04.0	.0000	- nnn4	BASE RNGPOWS SKIRT
1	.0000	.0133	.0001	.0010			
5	.0000	.0009	.0000	.0001	.0000		OWS/IU INTERFACE
3	.0000	.0014	.0000	•0002	.0000		IU/FAS INTERFACE
4	.0026	.0009	.0003	0 •	0.	0.	FAS 02 BOTL1,+Y +Z
5	0001	.0001	.0012	0 • .	0.	0.	FAS 02 BOTL2,+Y +Z
5	.0001	.0000	.0013	0.•	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0034	.0009	.0013		· Ø •	0.	FAS 02 BJTL4,-Y +Z
8	.0014	.0036	.0016	0.	0.	0.	FAS 02 83TL5, -Y -Z
9	.0004	.0006	.0044	Q •	0.	0 。	FAS 02 BOTL6, -Y -Z
10	.0010	.0011	.0001	0 .	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0015	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0013	.0022	.0002	0 .	0.	0.	FAS/AM/D1 IF, -Y
13	.0000	.0003	0000	0.	0.		FAS/DA IF, -Y -Z
14	• 0000	.0005	0000	0 •	0,•	Q.	FAS/AM IF, -Z
15	.0001	.0004	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0000	.0785	.0011	.0001	.0031		AM TUNNEL/SHEAR WB
17	.0002	.0269	.0001	.0006	.0002	.0100	
18	.0002	0018	.0010	.0007	.0008	.0107	MDA/STS INTERFACE
19	.0001	.0401	.0038	0003	.0003	.0034	MDA CONE/CYL ITRFC
20	.0061	.0887	.0027	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0011	.2065	•0000	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0002	.1550	.0002	0 .	0.	0 .	N2 TANK, +Z, LOWER
23	.0000	.9267	.0027	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0486	.0074	0 .	0.	8.	N2 TANK -Z, LOWER
25	.0001	.1285	.0051	0 .	0.	0.	N2 TANK, -Z, UPPER
25	0001	.0034	.0000	.0037	.0002	.0018	CM, FWD BULKHEAD
27	.0002	.0788	.0076	.0063	.0003	.0024	CM, AFT BULKHEAD
28	.0001	.0011	.0002	.0008	.0000	0000	SM, FWD BULKHEAD
29	.0002	.0089	.0009	.0034	.0000	.0002	SM, AFT BULKHEAD
30	.0001	.0049	.0006	6 •	0.	G.	LOWER D LATCH, DA
31	.0006	.0156	.0011	0.	0.	0.	LOWER +Y TRUNNION
32	.0005	.0131	,0006	0.	0.	0.	LOWER -Y TRUNNION
33	.0000	.0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	0000	.0003	.0000	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	.0001	0000	.0010	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	0000	.0000	.0000	8.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0004	.0002	.0000	0 •	0.	0.	ATM PN 6,7 IF, INNR
39	.0016	.0002	.0003	0 .	8.	0.	
40	.0009	.0000	0000	0.	0.	Ø.,	ATM PN 8,1 IF, INNR
41	.0008	.0000	0000	0 .	0.	0.	ATM PN 2,3 IF, INNR
42	.0003	.0000	.0093	.0000	.0000	.0000	CMG, -Y SIDE
43	.0004	.0000	.0000	.0000	.0000		CMG, FY SIDE
44	.0005	.0000	.0000	0000	.0000	.0000	
45	.0000	.0000	0.	0.	0.	0.	ATM SAS , PN 1
46	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	0,000	0 •	0.	0.		ATM SAS, PN 5
48	0000	0000	0 •	0.	0.	0.	ATM SAS, PN 7
49	.0008	.0008	0000	.0040	.0045	Ũ.	SPAP CENTER
50	.0010	.0006	.0000	.0049	.0071		GRAZCAN DENTER
•			-	***	***	# * * * * * * * * * * * * * * * * * * *	

.0257

.0136

.0323

SUM

.0269

.8534

.0482

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL 10DES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 56

ANALYTICAL FREQUENCY = 17.553 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GHC	GHC
NAME	(DX)	(YO)	(DZ)	(TX)	(TY)	(TZ)
9P/ONS SKIRT/IU/F1S	.0001	.0037	.0150	.0300	.0010	0000
5-FAS 02 TANKS	.0239	.0181	.0158	3.	0.	J.
MDA/STS/AM	.0010	.0017	.1869	.0309	.0317	.0005
5-AM N2 TANKS	.0101	.0041	.6978	0 •	3.	0.
COMMAND/SERVICE MOD.	.0001	.0016	.0545	.0010	.0031	.0001
DEPLOYMENT ASSEMBLY	.0014	.0121	.0007	0.	0.	0 •
ATH-RACK, CMGS, 4-SAS	.0007	.0013	.0005	.0001	.0000	.0000
ATM-SPAR CENTER	.0000	.0000	.0000	.0100	.0000	0 •
ATM-GRA/CAN CENTER	.0001	.0001	.0000	.0000	.0001	.0000
•						·
SUM	• G374	.0425	.8814	.0021	.0359	.0005

BR/OWS SKIRT/IJ/FAS	.0137
6-FAS 02 TANKS	.0579
MDA/STS/AM	. 2227
6-AM N2 TANKS	.6220
COMMAND/SERVICE MOD.	.0615
DEPLOYMENT ASSEMBLY	.0142
AT4-RACK, CMGS, 4-SAS	.0026
AT4-SPAR CENTER	.0002
ATM-GRA/CAN CENTER	.00JŽ

C-39 TABLE C-36

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 55 FREQUENCY= 17.55 4Z.

- wann							
NODE	GMC	GMC	GMC	GMC	SMC	GMC	NODE
NO.	(XC)	(YO)	(DZ)	(TX)	(TY)	· (TZ)	DESCRIPTION
				• • • • •			
1	. 3000	.0023	.0012	.0000	.0006	.0000	BASE RNG/OWS SKIRT
Ş	0000	.0000	.0003	.3000	.0000		OHS/IU INTERFACE
3	0006	.0000	.0005	0000	.0004		IU/FAS INTERFACE
4	.0141	.0104	.0022	0.	0 •	0.	FAS 02 BOTL1,+Y +Z
	.0013	.0005	.0085	0.	0.	0.	FAS 02 B)TL2,+Y +Z
5 6	.0042	.0027	.0004	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0007	.0019	.0012	0.	0.	0.	FAS 32 B3TL4, -Y +Z
8	.0038	.0033	.0003	0.	0.	0.	FAS 32 BOTL5,-Y -Z
9	0002	.0002	.0032	0.	0.		FAS 02 BOTL5,-Y -Z
10	.0000	0002	.0032	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	•0006	.0057	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0000	.0000	.0020	0.	0.	0.	FAS/AM/DA IF, -Y
13	0000	.0005	.0020	0 • 0 •	0.		FAS/D4 IFY -Z
					0.	0.	FAS/AM IF, -Z
14	.0001	9000	.0020		0.		FAS/DA IF, +Y +Z
15	.0000	.9002	.0000	0.		0.	
15	.9001	.0005	.0723	.0003	.0007		AM TUNNEL/SHEAR WB
17	.0001	.0003	.0680	.0002	.3104	.0001	AM TUNNEL/STS IF
18	.0003	0000	.0338	.8034			MDA/STS INTERFACE
19	.0005	.0009	.0127	.0001	.0143		MDA CONE/CYL ITREC
20	.0001	.0001	.3439	0.	0.		NE TANK, +Y, LOWER
21	.0000	.0000	.0869	0.	.0.	0.	N2 TANK, +Y, UPPER
22	.0038	.0020	.0163	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0015	.0005	.0117	0.	0.	0 •	N2 TANK, +Z, UPPER
24	.0042	.0009	.1095	0.	0.	3 •	N2 TANK -Z, LOWER
25	.0003	.0005	.0395	0.	0.	0.	N2 TANK, -Z, UPPER
25	0000	.0001	.0137	.0002	.0012		CM, FWD BULKHEAD
27	.0001	.0014	• 0 38 5	.0006	.0019	.0001	•
28	.0000	.0000	.0003	.0001	.0000		SM, FWD BULKHEAD
29	.0000	.0002	.0020	.0002	.0000		SM, AFT BULKHEAD
30	.0016	0004	0001	0 •	0.	0.	LOHER D LATCH, DA
31	0001	.0001	•0009	0 •	0.	0.	LOWER +Y TRUNNION
. 32	0001	.0124	0000	0 •	0 •	0.	LOWER -Y TRUNNION
33	0000	•0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0000	.0002	0.	0. •	0.	ATM PN 6,7 IF, OUTR
35	.0000	.0000	.0001	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	.0000	.0001	0.	0 •	0.	ATM PN 8,1 IF, OUTR
37	.0001	0000	.0000	0 •	0 •	0 •	ATH PN 2,3 IF, OUTR
38	.0000	.0004	.0001	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0003	.0003	.0000	0 •	0 •	0.	ATM PN 4,5 IF, INNR
40	.0002	0000	.0000	0.	0.	0 •	ATM PN 8,1 IF, INNR
41	0.000	.0001	.0000	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0000	.0005	.0000	.0001	.0000	.0000	CMG, -Y SIDE
43	.0006	.0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	S • .	0,•	0.	ATM SAS ,PN i
46	0000	0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0 •	0.	^	ATH SAS, PN 5
48	.0000	.0000	0.	0.	Ù.	0.	ATM SAS, PN 7
49	.0000	.7000	.0000	.0000	.0000	0.	SPAR CENTER
50	.0001	.0001	.0000	.0000	.0001		GRAZCAN CENTER .
•							·
SJM	.0374	. 04 26	. 8814	.0021	.0359	.0005	
	: · ·				· ,= ·		

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 58

ANALYTICAL FREQUENCY = 18.361 Hz.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F18	.0013	.3390	.0130	.0)17	0004	0017
6-FAS OZ TANKS	.1976	.0191	. 1202	0.	0.	ΰ.
MD A/STS/AM	.0005	.0421	.0016	.0120	.0001	.0354
5-AM N2 TANKS	.0011	.5097	。0038	0.	0.	0.
COMMAND/SERVICE 400.	.0002	.3182	.0000	.0304	.0000	•0009
DEPLOYMENT ASSEMBLY	.0009	.0056	.0051	0.	0.	0 •
ATM-PACK, CMGS, 4-SAS	.0180	.0064	.0072	.0002	.0005	•0000
ATM-SPAR CENTER	.0079	.0016	.0000	0072	.0154	0.
ATM-GRAZCAN CENTER	.0125	.0004	.0000	.0192	.0188	.0057
				***	***	
SUM	.2402	.6422	.0511	.0207	.0344	.0113

BRIONS SKIRT/IJ/FAS	. 1530
6-FAS 02 TANKS	.2359
MAYSTS/AM	.0526
6-AM N2 TANKS	.5146
COMMAND/SERVICE MOD.	.0198
DEPLOYMENT ASSEMBLY	。J116
ATY-RACK, CMGS, 4-SAS	.0324
AT1-SPAR CENTER	. 0 32 2
AT4-GRA/CAN CENTER	.0458

C-41 TABLE C-38

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

AVALV	TICAL	MODE	53
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FREQUENCY= 18.35 4Z.

			•				
POCH	GMC	GMC	GMC	GMC	SMC	GMC	NODE .
NO.	(DX)	(DY)	(DZ)	(TX)	(LA)	(TZ)	DESCRIPTION
1	.0000	. 2264	.0074	. 3014	.0002		BASE RNG/OWS SKIRT
2	0000	•000	.0001		.0001		OWS/IU INTERFACE
3	0000	0001	.0002	.0002	0007		IU/FAS INTERFACE
4	.0384	.9062	0001	0 .	0.	0.	FAS 02 BOTL1,+Y +Z
5	. 3715	.0016	.0081	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	.0051	.0024	.0053	0	0•	0 •	FAS 02 BOTL3, -Y +Z
7	.0051	.0025	.0007	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	• 3326	.0047	.0005	0.	0.	0.	FAS 02 BOTL5, -Y -Z
9	. 3449	.0017	.0057	0.	0.	0.	FAS '02 BOTL6, -Y -Z'
10	.0003	.0018	.0001	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0003	.0034	0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	. 1004	.0020	.0000	0.	0.	0.	FAS/AM/DA IF, -Y
13	.7004	.0047	.0050	0.	0.	0.	FAS/DA IF, -Y -Z
14	• 0 0 0 0	.0007	0000	0.	8.	0.	FAS/AM IF, -Z
15	.0030	.0001	.0002	0.	0.		FAS/DA IF, +Y -Z
15	• 0 0 0 0	.0104	.0007	.0000	.0001		AM TUNNEL/SHEAR WB
17	.0001	.0200	.0002	0002	.0000		AM TUNNEL/STS IF
18	.0002	.0058	.0005	.0006			MDA/STS INTERFACE
19	.0002	.0059	.0001	.0011	.0000		MOA CONE/CYL ITRFC
20 21	•0001	.0010	.0023	0 • 0 •	0. 0.	0. 0.	N2 TANK, +Y, LOHER
22	.0000 .0005	.0031 .0104	.0007	0.	0.	0.	N2 TANK, +Y, UPPER
23	• 1002	.0653	.0001	0 •	0.		N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER
24	• 0 10 5	. 4266	.0006	0.	0.	0.	N2 TANK -Z, LOWER
25	.0001	.0034	.0001	0.	0.	0.	N2 TANK, -Z, UPPER
26	0000	.0052	.0001	0000	.0000		CM, FWD BULKHEAD
27	0000	.0123		.0003	0000		CM, AFT BULKHEAD
28	•0001	.0001		.0000	.0300		SM, FWD BULKHEAD
29	.0001	.0006	.0000	.0001	.0000		SM, AFT BULKHEAD
30	.0007	.0001	.0049	0.	0.	0.	LOWER D LATCH, DA
31	.0000	.0056	0000	0.	6.	0.	LOWER +Y TRUNNION
32	.0001	0001	.0002	0.	0.	0.	LOWER -Y TRUNNION
33	.0001	.0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	. 7884	.0000	.0001	0.	0.	0.	ATM PN 6.7 IF, OUTR
35	0001	0000	.0039	0.	0.	0.	ATM PN 4,5 IF, OUTR
35	.0007	.0000	0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0002	.0002	.0003	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0013	.0003	.0000	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0027	0002	.0015	0.	0.	0.	ATM PN 4,5 IF, INNP
40	. 9326	0002	.0000	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0034	.0030	.0001	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0005	.0026	.0014	.0000	.0001	.0000	
43	.0016	.0004	0000	0000	.0000	.0080	
44	.0048	.0002	.0000	.0001	.0004	.0000	
45	0000	0000	0 .	0 .	0.	0.	ATM SAS , PN 1
46	0000	0000	0.	0 .	0.	0.	ATM SAS, PN 3
47	0000	0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
49	·0079	.0016	.0000	.0072	.0154	0.	SPAR CENTER
50	.0126	.0004	.0000	.0092	.0188	.0057	GRAZCAN SENTER
	40 to 18 to	***	-	CO 60	62 43 Ap us	****	•
SUM	.2402	.6422	. 05 11	.0207	. 0344	.0113	

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 65

ANALYTICAL FREQUENCY = 19.644 HZ.

COMPONENT	GMC	GMC	GMC	GHC	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
3P/OHS SKIRT/IU/FAS	.0001	.0257	.0081	.0161	.0000	.0030
5-FAS OZ TANKS	.2075	.0268	.0210	0 •	0.	3.
MDA/STS/AM	. 2092	.0005	. 3037	.0105	.0017	.0001
5-AM N2 TANKS	.1053	.0363	.0517	3 •	0.	0.
COMMAND/SERVICE 400.	.0584	.0002	.0015	.0381	.0004	• 0 0 3 1
DEPLOYMENT ASSEMBLY	0092	.0957	.0554	0.	0.	0.
ATM-PACK, CMGS, 4-54S	.0014	.0427	. 3024	.0375	.0004	.0003
ATM-SPAR CENTER	.0002	.0047	.0002	.0302	.0001	0.
ATM-GRAZCAN CENTER	.0000	.0093	.8001	.0302	.0001	.0031
SUM	.5729	. 2419	. 1542	.0246	.0027	.0037

BR/OWS SKIRT/IJ/FAS	.0531
6-FAS 02 TANKS	. 2553
MDA/STS/AM	.2157
6-AM NZ TANKS	. 2034
COMMAND/SERVICE MOD.	.0608
DEPLOYMENT ASSEMBLY	.1419
AT1-RACK, CMGS, 4-SAS	.0547
AT4-SPAR CENTER	.0053
AT1-GRA/CAN CENTER	•0099

C-43 TABLE C-40

GENERALIZED-MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 55

FREQUENCY= 19.64 4Z.

אסרא <u>-</u>	GYC	GMC	GMC	GMC	- 3MC	GMC	HODE
4D.		(DY)	(DZ)	(TX)	(YY)	(TZ)	DESCRIPTION
1	.0000	.0060	.0015	.0143	.0001		BASE RNG/OWS SKIRT
2	.0000	.0023	.0000	.0008			OWS/IU INTERFACE
3	0005	00054	.0000	.0010	0000		IU/FAS INTERFACE
4	.±374	.0013	.0018	0.	0.	0.	FAS 02 B)TL1,+Y +Z
5	* 0 3 0 3	.0002	.0027	0.	0.	0. 0.	FAS 02 80TL2,+Y +Z FAS 02 80TL3,-Y +Z
5 7	.0049	.0007	.0548	0.	0. G.	G.	FAS 02 BOTL4,-Y.+Z
5	0001	.0078	.0011	6 •. 0 •	0.	0.	FAS 02 BOTL5, =Y -Z
9 9	.0101 .0249	.0117	.0012	0.	0.	0.	FAS 02 BOTLS, -Y -Z
10	.0301	0002	.0022	0.	0.	0.	FAS/AM/DA IF: +Y
11	.0002	.0007	0000	9.	8.	G.	FAS/AM/DA IF, +Z
12	.0031	.3011	0001	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0001	.0032	.0032	0.	0.	0.	FAS/DA IF, -Y -Z
- 14	.0031	.3862	.0004	0.	0.	0.	FAS/AM IF, -Z
15	0000	0001	.0007	ŭ.	0.		FAS/DA IF, +Y -Z
15	. 7243	.0001	.0007				AM TUNNEL/SHEAR WB
17	.9452	.0001		.0001			AM TUNNELISTS IF
18	.3743	.0003	.0022	.0002	.0002	.0000	MOA/STS INTERFACE
19	.0554	.0000	0000	.0002	.0014	.0001	MDA CONE/CYL ITRFC
50	.0324	.0003	.0003	0.	0.	0.	NZ TANK, +Y, LOHER
21	.0027	.0000	.0575	0 •	0.	0.	NO TANK, +Y, UPPER
22	.3372	.0000	.0001	0.	0 •		NE TANK, +Z, LOWER
23	.0038	.0112	.0000	0 6	0.	0.	N2 TANK, +Z, UPPER
24	.0263	.0195	.0032	0.	0.	0.	NZ TANK -Z, LOWER
25	.0028	.0052	.0005	0.050	0.004	0.	NE TANK, -Z, UPPER
25 27	.0001 .0068	.0000	.0005	.0000			CM, FWO BULKHEAD CM, AFT BULKHEAD
28	.0151	.0001	.0001	.0000	~.0000	.0000	
29	9354	.0001	.0000	.0000	.0000		SM, AFT BULKHEAD
30	.0010	0263	.0017	0.	G .	0.	LOHER D .ATCH, DA
31	0052	.0669	.0244	0.	0.	0.	LOWER +Y TRUNNION
32	0050	.0551	.0292	0.	0.	0.	LOHER -Y TRUNNION
33	.0001	.0000	.0000	D .	0.	0 .	EREP PACKAGE C.G.
34	.9800	.0017	0000	0 .	0.	0.	ATM PN 6,7 IF, OUTR
35	.0033	.0008	.0010	0 .	` 0	0 •	ATM PN 4,5 IF, OUTP
35	0001	.0008	.0001	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0001	.0003	.0000	C .		0.	ATM PN 2,3 IF, OUTP
38	0035	.0084	.0001	0 ^	0.	0 0	ATM PN 5:7 IF, INNR
39	.0001	.9848	.0007	0.	0.	€.	ATM PN 4,5 IF, INNR
40	.0000	.0007	.0001	0 •	0 .	0.	ATH PN 8,1 IF, INNR
41	.0007	.0054	0000	0.	8.	0.	ATM PN 2,3 IF, INNP
42	- 43000	oc157	.0004	.0073	.0001		CMG, -Y SIDE
43	.0630	.0029	.0001		.0001		CMG, +V SIGE CMG, +X SIGE
44 45	.0317 0000, ''	•9 0 1 0	.0000	.0001	.0002 0.	.0002	ATM SAS ,PN 1
45	0000.	0000. 0000.~	0.	0. 0.	ن. قر	0.	ATM SAS, PN 3
47	-,0000	0000	0. 3.	0.	0.	0.	ATM SAS, PN 5
4 H	.0000	- 0000	0.	0.	0.	Û e	ATM SAS, PN 7
49	.0002	,00 47		.0002		0.	SPAR CENTER
50	, 9 G G G	46693		.0002	.0031		GRAZCAN DENTER
	Maria Maria	and the state one.	in the server	100 mg 485 485	****	G 40 G	and the second s
SUM	.5729	2819	. 1542	.0246	.0027	.0037	•

SECTION D

Two-Dimensional Plots of Analytical Modes

D-2

ORBITAL CONFIGURATION MODAL SURVEY DEGREE OF FREEDOM TABLE FOR MODE SHAPES AND DISCRETE MASS MATRIX

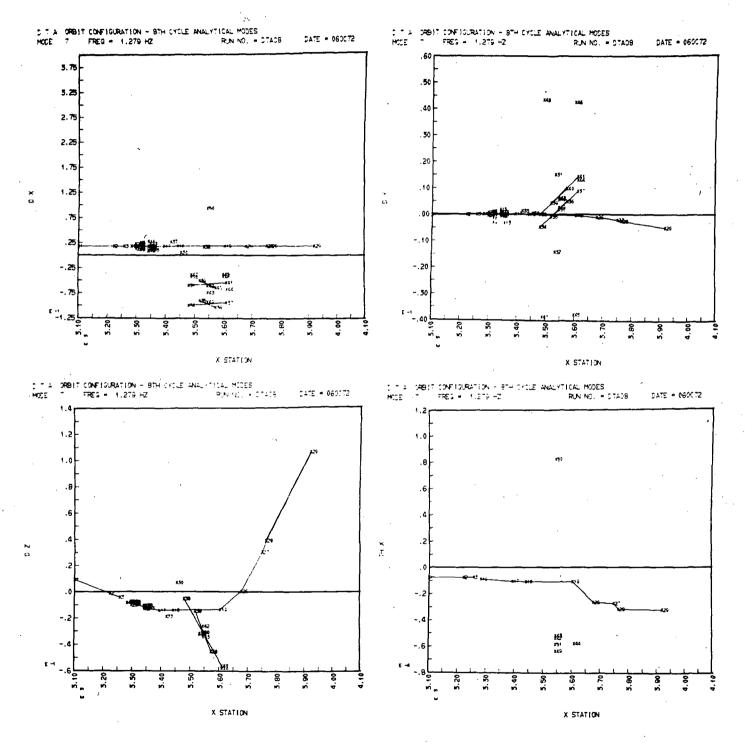
NODE		DEGR	EES OF	FRE	ED OM			LOCATION		•
NO.	DX	DY	DZ	TX	TY	TZ	X	. γ	Z	DESCRIPTION
1	1	2	3	4	5	6	3100.00	0.000		BASE RNG/DWS SKIRT
?	7	8	g	10	11	12	3223.000	0.000		OHS/IU INTERFACE
3	13	14	15	16	17	18	3258.555	0.000		IU/FAS INTERFACE
4	19	20	21				3316.555	81.473		FAS 02 BOTL1,+Y +Z
5	22	2.3	24				3316.555	46.683		FAS 02 BOTL2,+Y +Z
6	25	25	27.				3316.555	-46.683		FAS 02 BOTL3,-Y +Z
7	28	29	30				3316.555	-81.473		FAS 02 80TL4,-Y +Z
-8	31	32	33				3316.555	-81.473		FAS 02 BOTL5, -Y -Z
q	34	35	36				3316.555	-46.683		FAS 02 BOTL6, -Y -Z
10	37	38	39				3341.615	116.050		FAS/AM/DA IF, +Y
11	40	41	42			•	3341.615	0.000		FAS/AM/DA IF, +Z
12	43	44	45				3341.615			FAS/AM/DA IF, -Y
13	46	47	48				3355.700	-82.346	-81.488	FAS/DA IFY -Z
14	49	5n	51				3341.615			FAS/AH IF, -Z
15	52	53	54				3341.615			3 FAS/DA IF, +Y -Z
16	55	55	57	58	59	60	3282.365	0.000		AM TUNNEL/SHEAR WB
17	51	62	63	64	65	66	3394.615	0.000		AM TUNNEL/STS IF
18	67)68	69	70	71	72	3441.765	0.000		MDA/STS INTERFACE
10	73	74	75	76	77	78	3505.000	0.000	0.000	
20	79	81	81	70	• •	7 0	3297.565	69.050		NE TANK, +Y, LOWER
21	82	83 83	84			•	3346.365	69.050		N2 TANK, +Y, UPPER
22	85 _/	85	87				3297.665	0.000		N2 TANK, +Z, LOWER
23	88	89	90			`	3348.365	0.000		NZ TANK, +Z, UPPER
24	91	92	93				3297.665	0.000		N2 TANK -Z, LOWER
25	94	95 95					3348.365	0.000		•
26	97	77 08	96 00	4 0 0	4.04	4 11 2		0.000		NZ TANK, -Z, UPPER CH, FWD BULKHEAD
	-			100	101	102	3578.000			CM, AFT BULKHEAD
	103 109	104		106	107	108	3751.600	0.000 0.000		SM, FWD BULKHEAD
		110 116		112 118	113 119	114 120	3766.500	0.000		
	115	122		110	119	120	3921.500	0.000		SH, AFT BULKHEAD LOMER D LATCH, DA
	121 124	125	123				3454.765 3532.915	113.500		LOWER OF TRUNNION
	127		126					-113.500		LOWER -Y TRUNNION
		128	129							
	130 133	131	132				3418.765	0.000		EREP PACKAGE C.G. ATM PN 6,7 IF, OUTR
	136	134	135				3479.094		-252.500 -252.500	
		137 140	138				3517.701			ATM PN 8,1 IF, OUTR
	139	143	141				3572.299		-252.500	
	142	146	144				3510.906			•
	145		147				3479.894			ATH PN 6,7 IF, INNR
	148	149	150				3517.701 3572.299			ATH PN 4,5 IF, INNR
	151	152	153							ATH PN 8,1 IF, INNR
	154	155	156	460	484	460	3510.906			ATH PN 2,3 IF, INNR
	157	158		160	161	162	3545.000			5 CMG, -Y SIDE
	163	154		166	167	168	3545.000		-181.995	
	159	170	171	172	173	174	3510.906		-182.000	CMG, +X SIDE
	175	176					3599.930		-207.490	ATM SAS ,PN 1
	177	178						1 - 54.9301		ATH SAS, PN 3
,	179	180						9 -54.9301		ATM SAS, PN 5
	181	18?	4.65		4.67		3490.069		-207.490	ATH SAS, PN 7
	183	184		186	187	407	3545.000			SPAR CENTER
טכ	188	189	190	191	192	193	3545.000	U • UU D	-240.709	GRA/CAN CENTER

Two dimensional plots of the correlated analytical modes as defined in Table 5.17 of the main text are presented in this section. The plots are presented in the same manner as the test mode plots contained in Section A with the following exceptions:

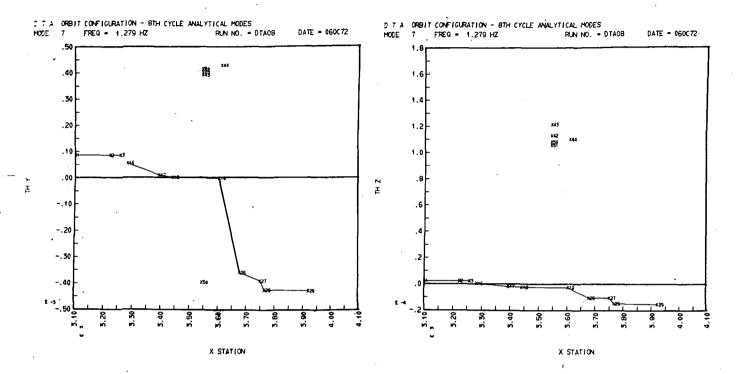
- 1. Analytical modes are plotted correctly between node 3 and node 16.
- 2. Node 50 is plotted with the incorrect sign in the X, Y, TH X, and TH Y planes.

The plotted node points and associated degrees of freedom are defined on page D-2 of this section.

Plot D-I

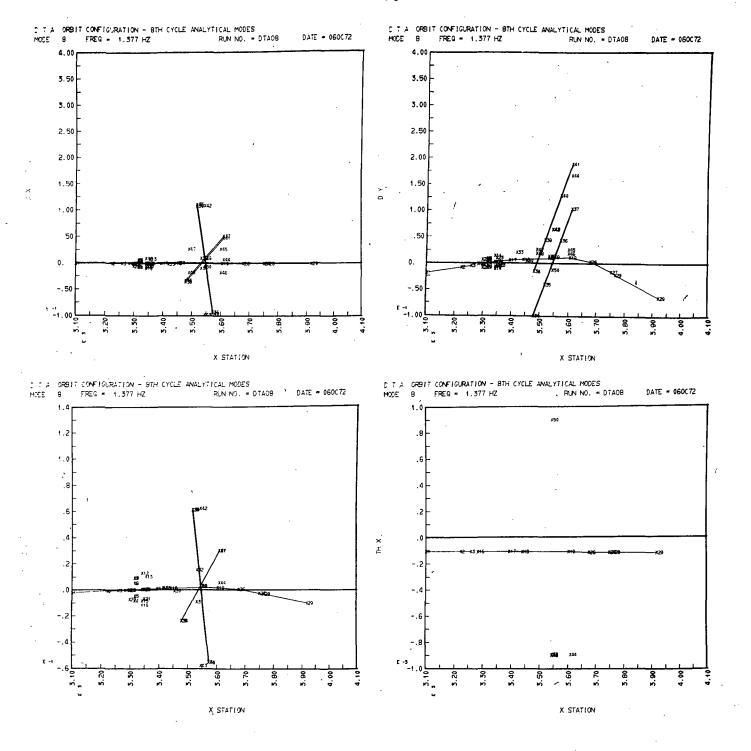


Plot D-I

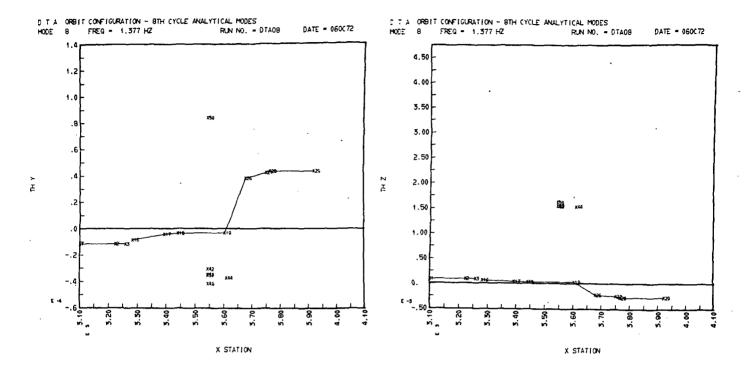


ORIGINAL PAGE IS OF POOR QUALITY

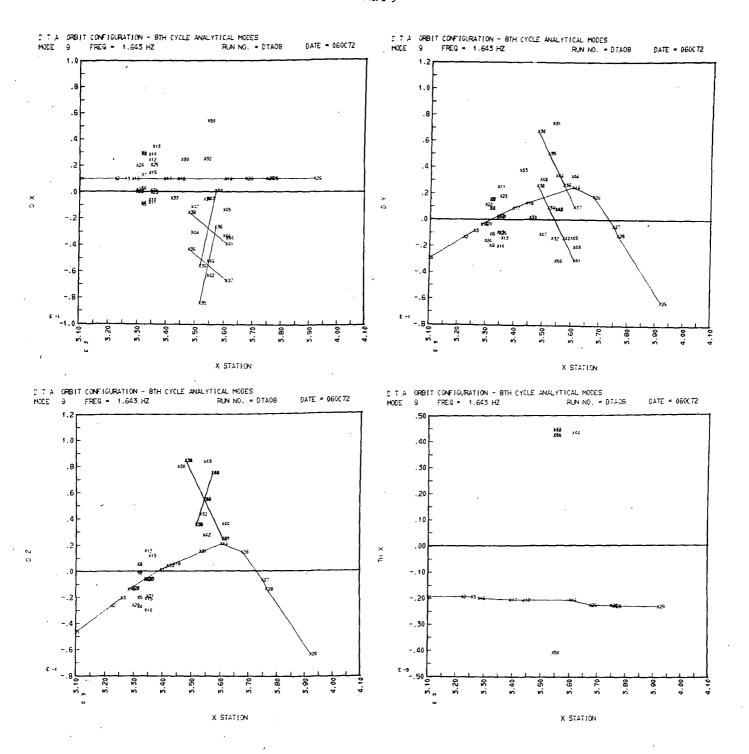
Plot D-2



Plot D-2

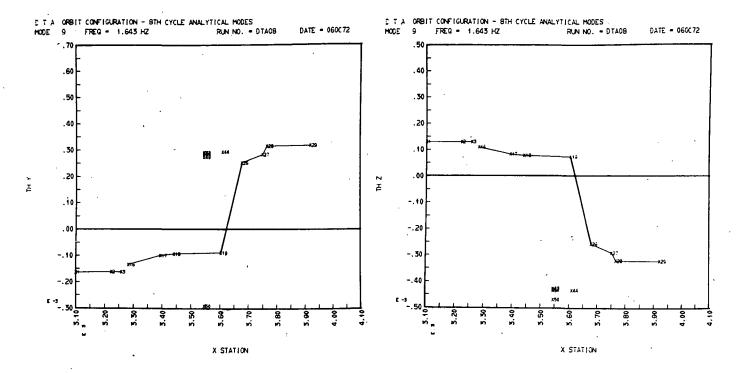


Plot D-3



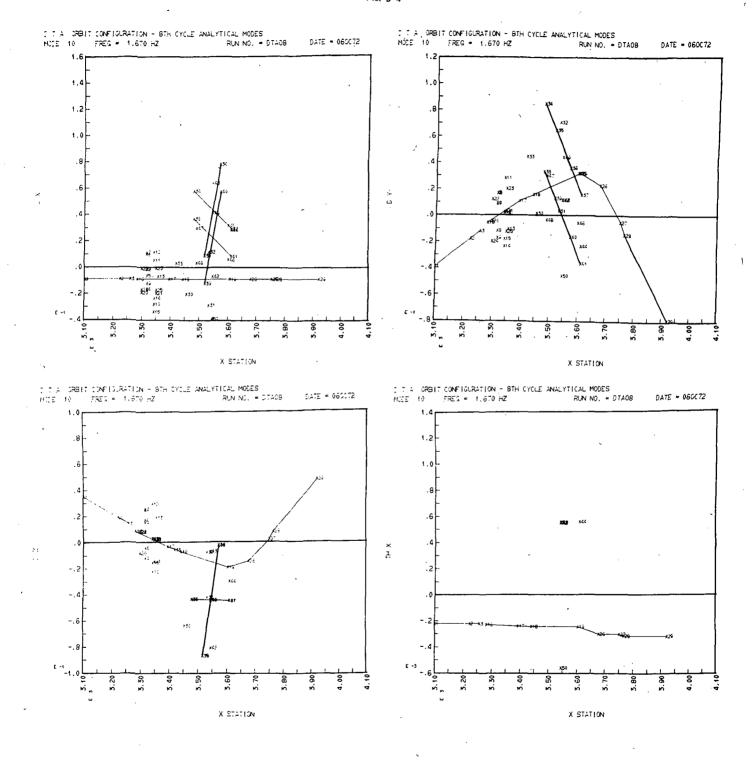
ORIGINAL PAGE IS OF POOR QUALITY

Plot D-3

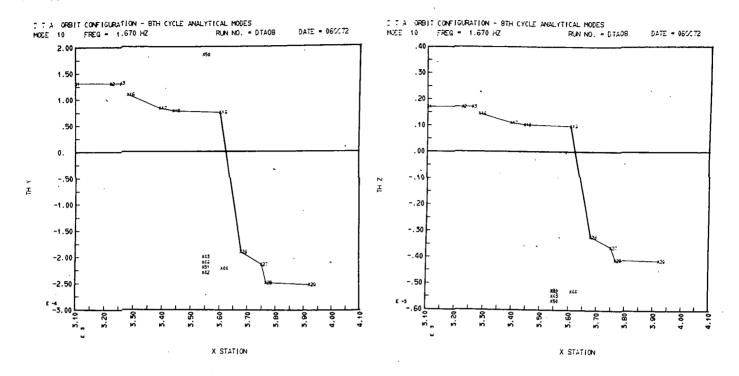


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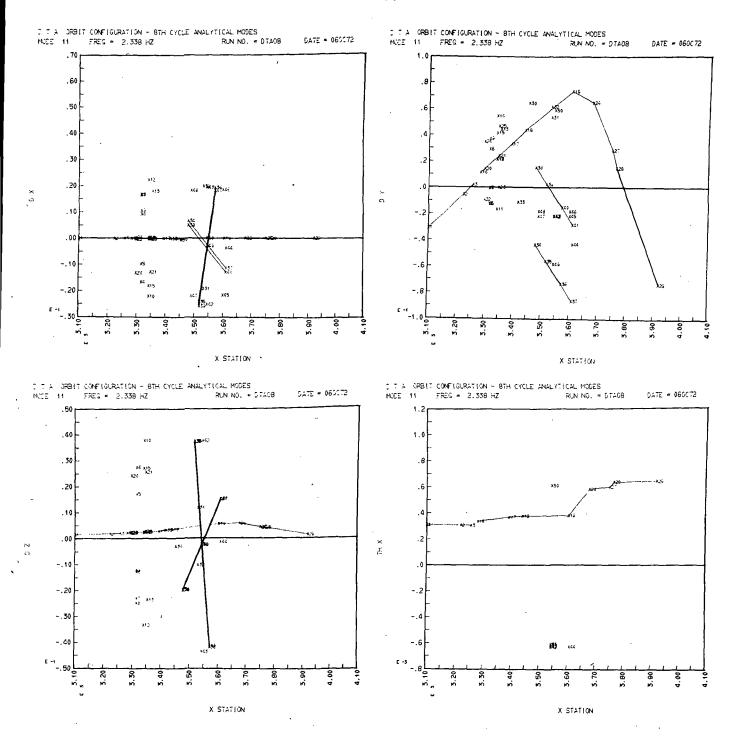
Plot D-4

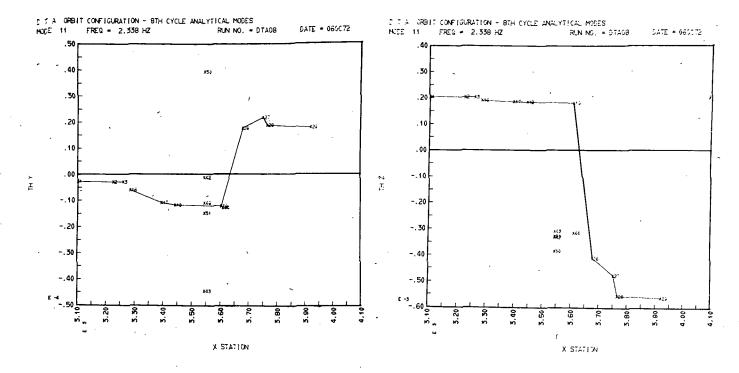


Plot D-4

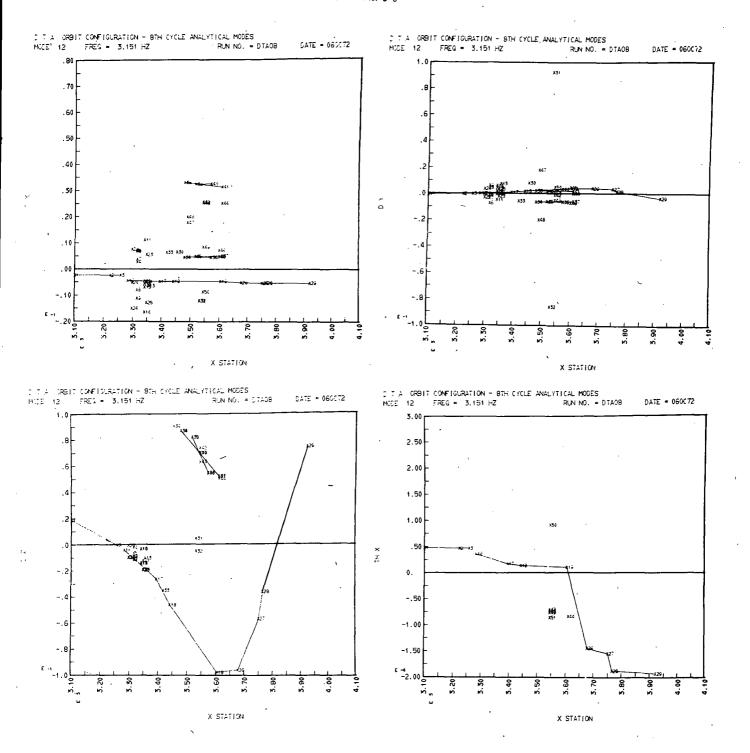


Plot D-5

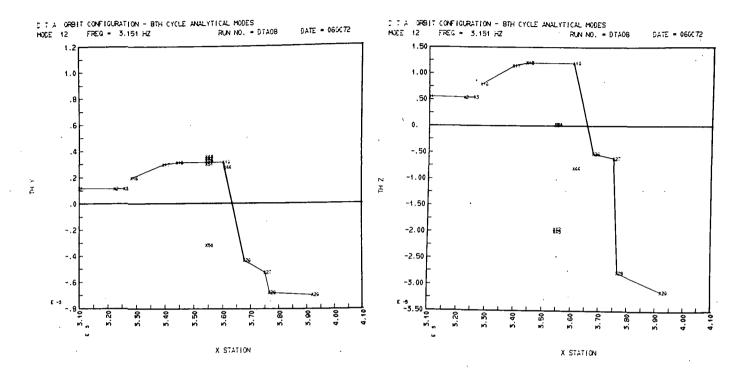




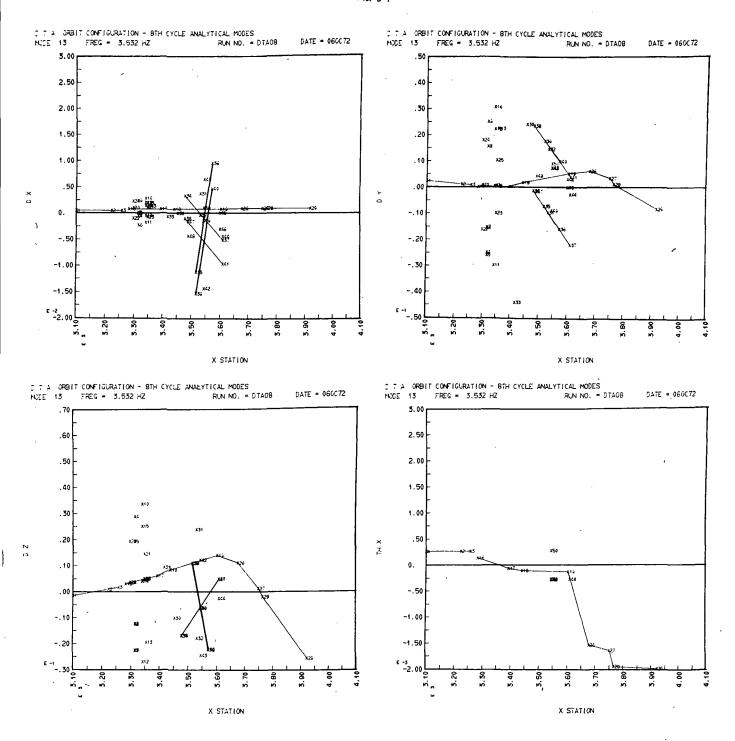
Plot D-6



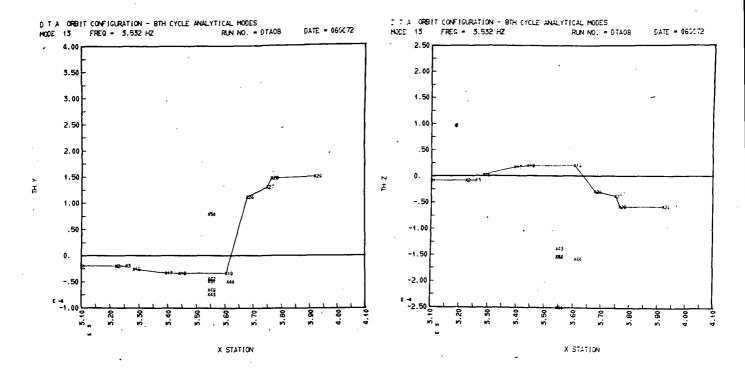
Plot D-6



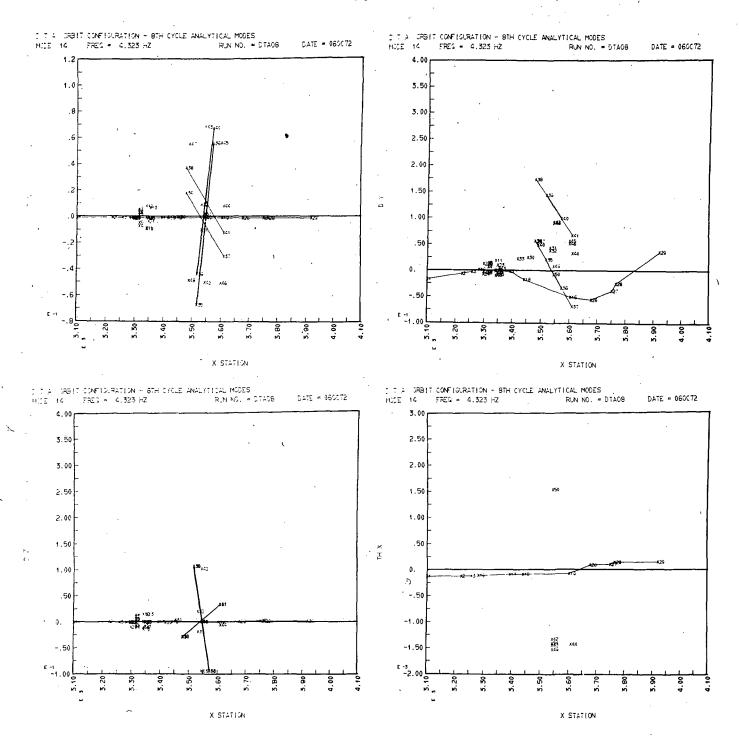
Plot D-7



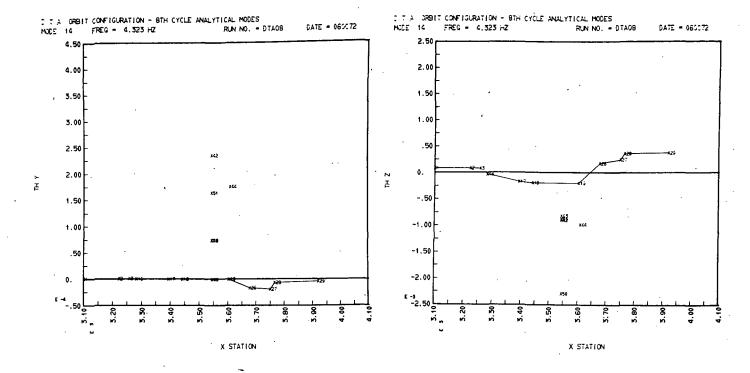
Plot D-7



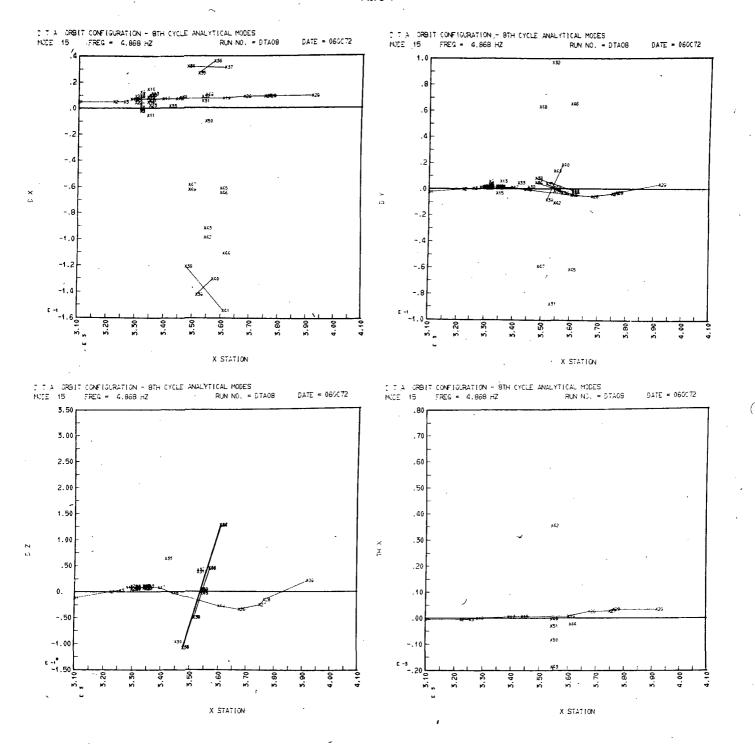
Plot D-8



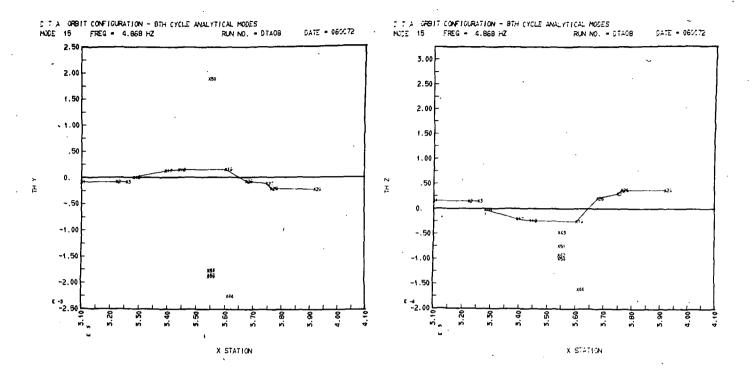
Plot D-8



Plot D-9

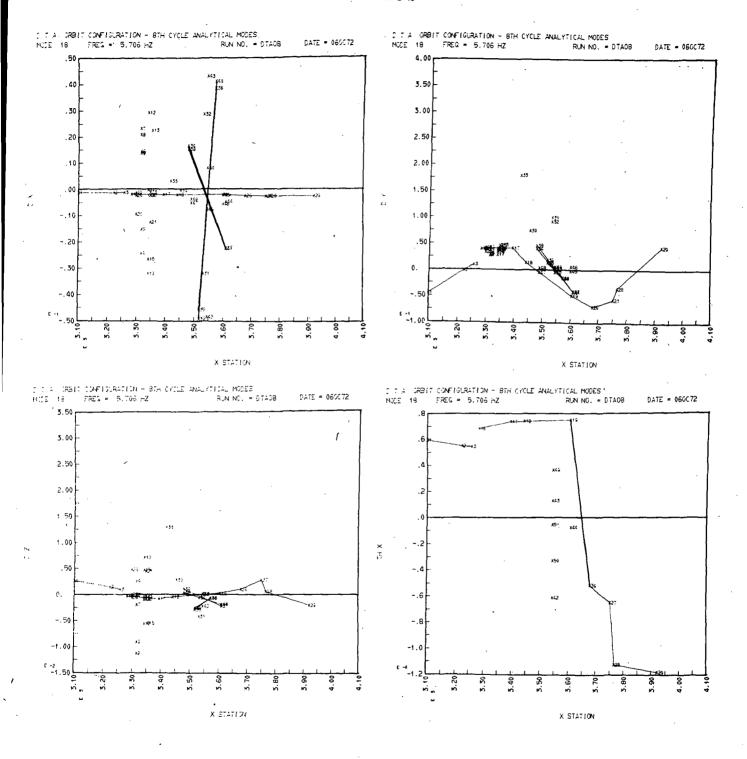


Plot D-9

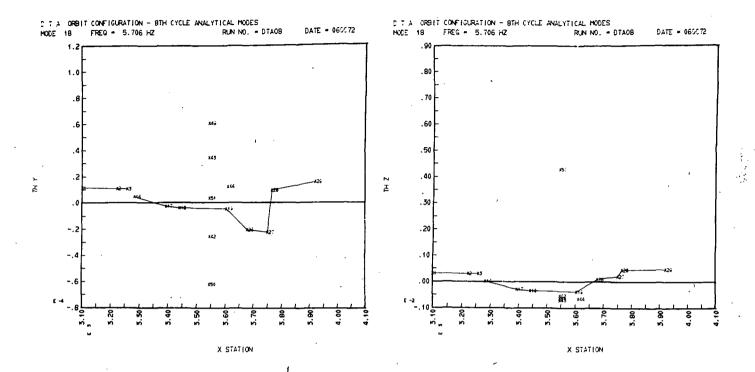


ORIGINAL PACIFIE

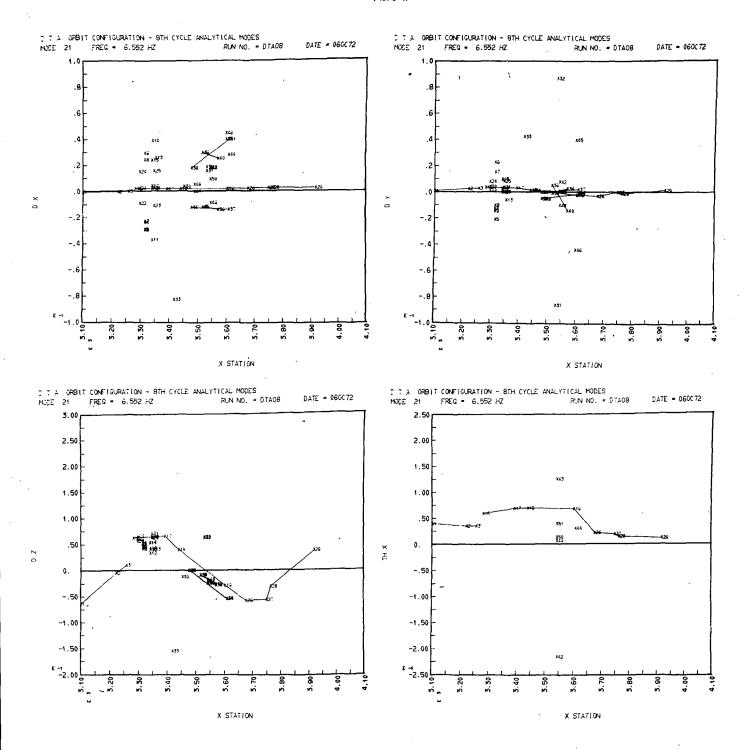
Plot D-10



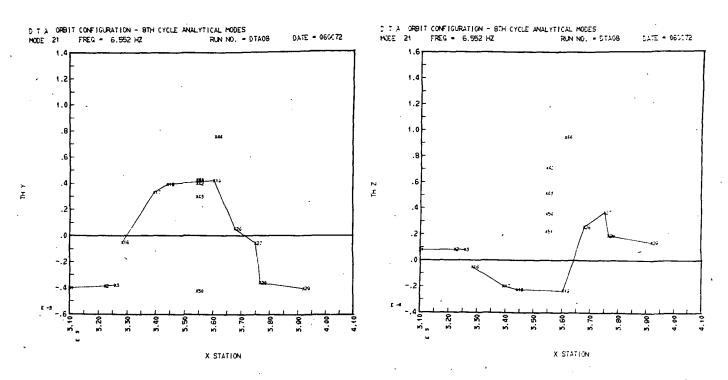
Plot D-10



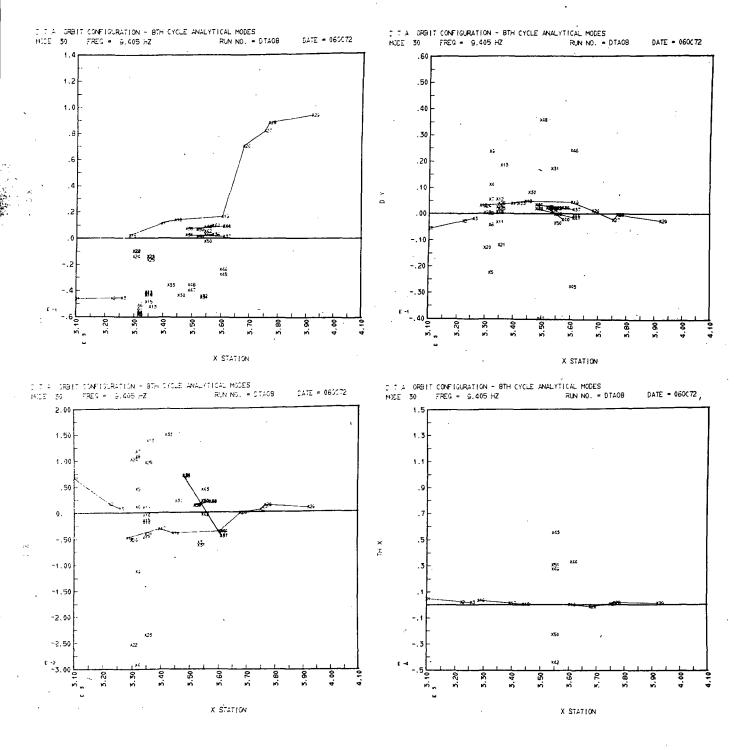
Plot D-II



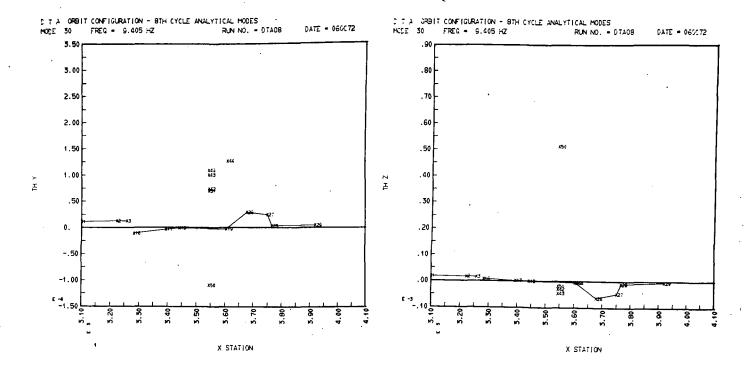
Plot D-II



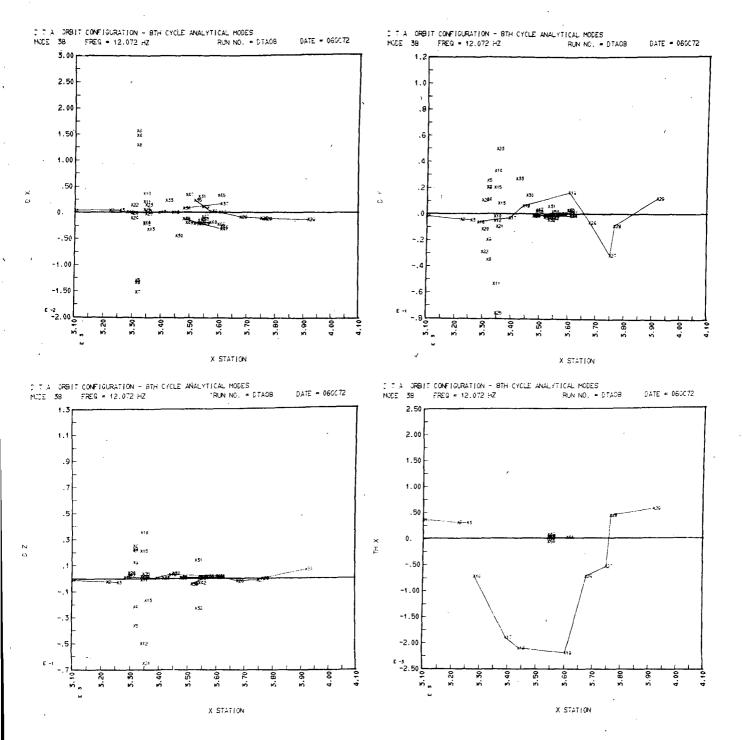
Plot D-12

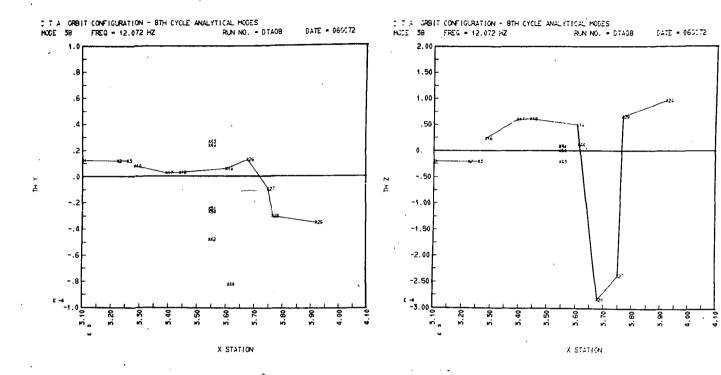


Plot D-I2

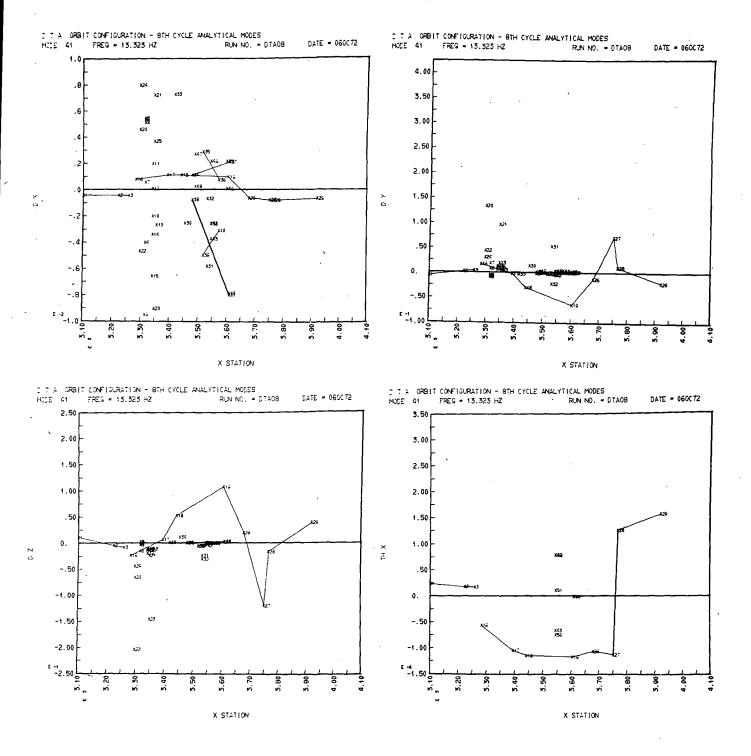


Plot D-13

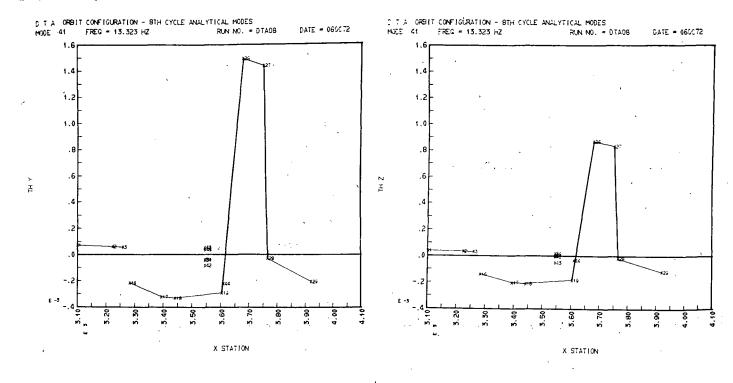




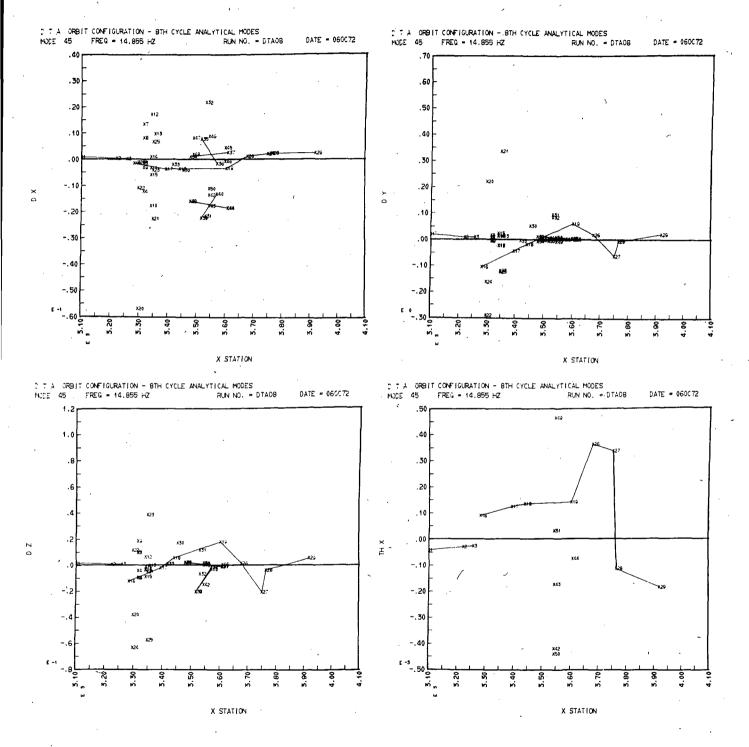
Plot 0-14



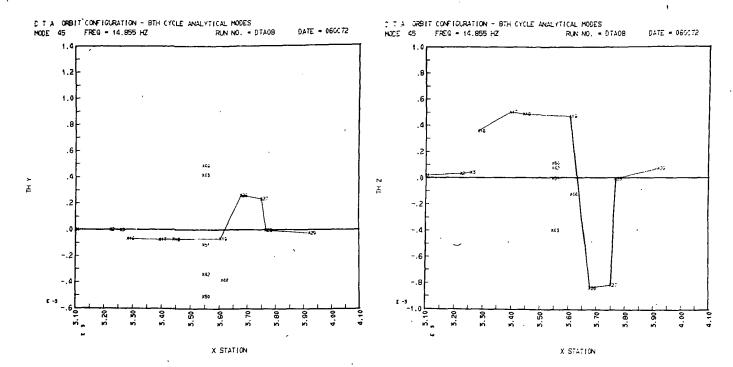
Plot D-14



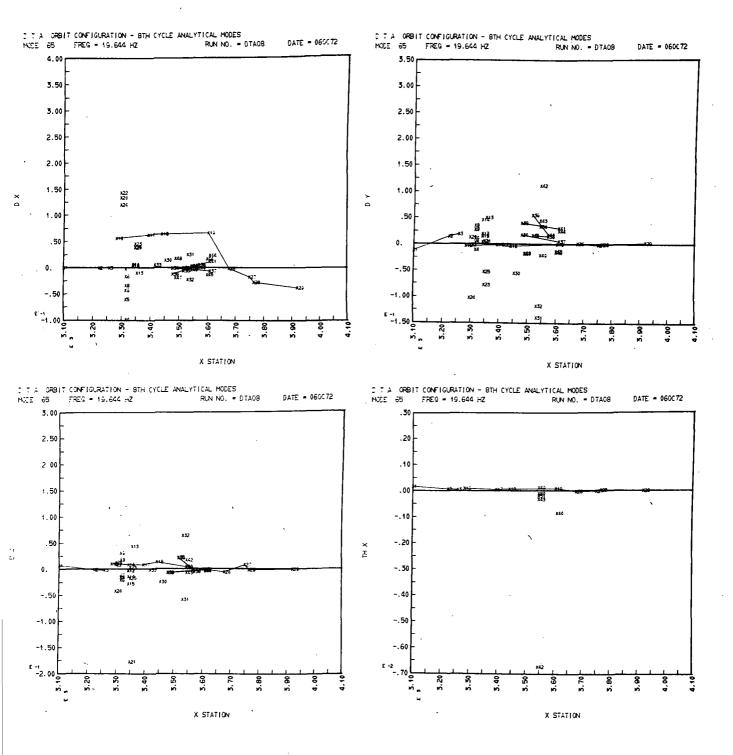
Plot D-15



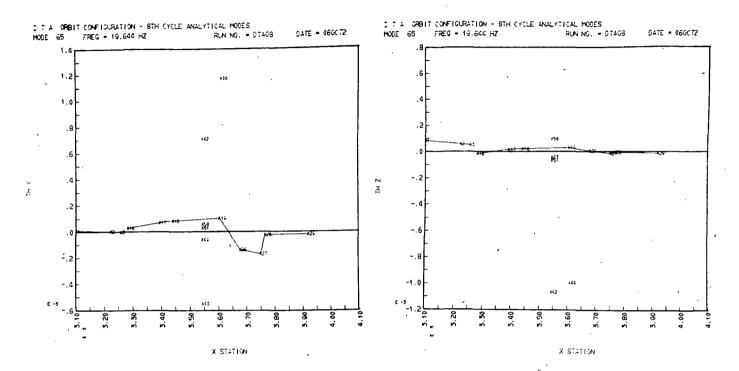
Plot D-15



Plot D-16



Plot D-16



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Section E

UNCOUPLED MODES FLIGHT CONFIGURATION 1.2

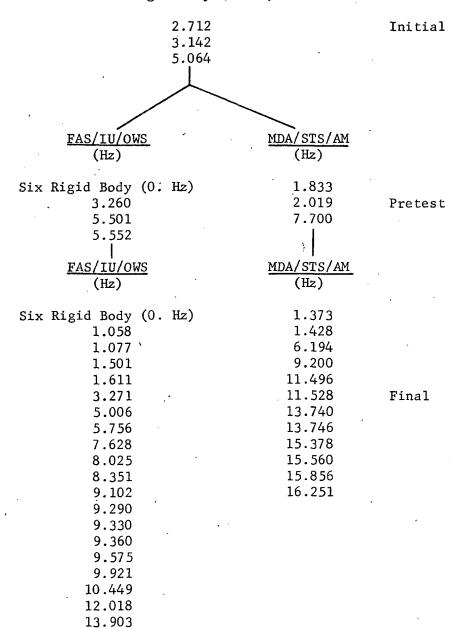
In this section (E-1 through E-7) the Skylab uncoupled component modal data are presented in terms of frequency data. The data are arranged according to three model development cycles; initial, pretest and final. During the development of the model, major subcomponents were subdivided according to areas of major concern. This evolution of model components is depicted where applicable.

Uncoupled Modes Flight Configuration 1.2

Main (OWS/IU/FAS/AM/STS/MDA) Modes

(Hz)

Six Rigid Body (0. Hz)



14.480 16.090

ATM (ATM Rack, GRA, Spar/Canister, DA) Modes (Hz) .821 1.163 1.242 1.362 1.395 Initial 2.595 2.774 3.166 3.526 3.664 4.709 4.866 4.987 Spar/Canister, DA (Depl.)) Modes ATM/DA (ATM Rack, GRA, (Hz) .868 1.126 1.252 1.408 1.573 2.689 Pretest 2.839 3.276 3.306 3.503 3.889 4.501 4.878 5.512 5.782 Rack (OL) Spar/GRA Canister DA (Depl.) (Hz) (Hz) (Hz) (Hz) 2.900 .569 1.069 6.120 1.081 3.057 7.197 1.182 1.108 3.284 4.320 9.385 2.516 3.344 5.339 10.578 Final 2.704 5.556 3.835 10.578 3.236 4.255 6.171 14.058 5.550 5.063 6.749 14.492 13.294 6.443 5.120 15.448

18.739

11.928 13.369 15.265

6.496

7.033

9.700 10.557 11.306

10.675

12.535

16.815

Uncoupled Modes Flight Configuration 1:2

Farside (+Y) OWS Solar Array Modes (OWSFS)

Initial Pr		
(Hz)	etest (Hz)	Final (Hz)
(112)	(nz)	(nz)
.349	.456	.383
.475	.563	.446
.489	.733	.458
.557	.759	.522
	.059	.909
	.064	.910
	.065	.910
	279	2.003
	.581	2.235
	.057	2.569
	.246	2.597
	347	2.955
	.650	3.105
= ;	.654	3.209
	.664	3.210
	.767	3.229
	.621	3.660
6.061		6.139
6.175		6.471
6.209		7.783
,		9.647
		13.540
•		13.730
•		13.828
		16.926

Uncoupled Modes Flight Configuration 1.2

Nearside (-Y) OWS Solar Array Modes (OWSNS)

<u>Initial</u> (Hz)	Pretest (Hz)	Final (Hz)
·/	(/	(12)
.349	.465	.385
• 475	.561	.447
.489	.733	.458
.557	.759	.530
.934	1.059	.909
1.298	1.064	.910
1.301	1.065	.910
1.323	1.276	1.985
2.539	2.307	2.280
2.566	3.590	2.567
2.621	4.054	2.598
3.229	4.246	2,948
3.996	4.347	3.083
4.421	4.650	3.209
4.436	4.654	3.210
4.483	4.663	3.226
5.353	4.815	3.722
6.061	9.047	6.102
6.175		6.471
6.209		8.675
•		9.317
` \ ·		13.569
•		13.720
		13.833
-	·	`17.679

Uncoupled Modes Flight Configuration 1.2

Axial-Docked CSM Modes

Initial	Pretest	<u>Final</u>
(Hz)	(Hz)	(Hz)
•		
1.089	1.050	1.050
1.117	1.068	1.069
2.956	2.952	3.662
5.624	5.623	5.623
6.523		6.520
		9.037
		9.637
		10.627
		10.998
		14.322
		16.020

ATM Solar Array Modes Forward Farside (Bay 1)

.206	.200	.184
.740	.607	.558
.987	.727	.663
1.839	.957	.893
2.368	1.424	1.336
2.546	2.314	2.037
3.371	2.627	2.532
3.964	3.326	3.065
4.713	3.704	3.372
5.490	4.639	4.034
5.792	4.911	4.715
6.862	6.631	6.097
		8.674
	•	9.149
		9.365
	•	9.879
		11.057
		12.903
		15.762

ATM Solar Array modes for:

forward nearside (Bay 3) aft nearside (Bay 5) aft farside (Bay 7)

Same as modes for forward farside (Bay 1)

Section F

COUPLED MODES FLIGHT CONFIGURATION 1.2

The following table shows the coupled modes for the analytical model of flight configuration 1.2. These modes are presented for three model phases; initial, pretest and final. For each model phase, the mode number, major contribution and coupled frequency are presented. A frequency cutoff of 15 Hz was used in order to stay within computer size limitations.

Coupled Modes Flight Configuration 1.2

	Initial			Pretest	. •		Final	
Mode	Major Contributor	Coupled Frequency	Mode	Major Contributor	Coupled Frequency	Mode	Major Çontributor	Coupled Frequency
1	Main l	0.	1	FAS/IU/OWS 1	0.	1	FAS/IU/OWS 1	0.
2	Main 3	0.	2	FAS/IU/OWS 2	0.	2	FAS/IU/OWS 2	0.
3	Main 3	0.	3	FAS/IU/OWS 3	0.	3	FAS/IU/OWS 3	0.
4	Main 4	0.	4	FAS/IU/OWS 4	0.	4	FAS/IU/OWS 4	0.
5	Main 5	0.	5	FAS/IU/OWS 5	0.	5	FAS/IU/OWS 5	0.
6	Main 2	0.	6	FAS/IU/OWS 6	.0.	6	FAS/IU/OWS 6	0.
7	SP5-1	.206	7	ATMSA5 1	.200	7	ATM/SA5-1	.183
8	SP7-1	.206	8	ATMSA7 1	.200	8	ATM/SA7-1	.183
9	SP3-1	.207	9	ATMSA3 1	.202	9	ATM/SA3-1	.185
10	SP7-1	.211	10	ATMSA1 1	.205	10	ATM/SA1-1	.188
11	OWSNS1	.353	11	OWSFS1	.465	11	OWSFS1	.377
12	OWSFS1	.369 ⁻	12	OWSNS1	.479	12	OWSNS1	.385
13	OWSNS2	.475	13	OWSNS2	.570	13	OWSFS2	.444
14	OWSFS2	.476	14	OWSFS2	.575	14	OWSNS2	.445
15	OWSNS3	.489	15	ATMSA5-2	.607	15	OWSFS3	.458
16	OWSFS3	.489	16	ATMSA7-2	.607	16	OWSNS3	.458
17	OWSFS4	.561	17	ATMSA3-2	.607	17	OWSFS4	.499
18	owsns4	.566	18	ATMSA1-2	.608	18	owsns4	.505
19	SP7-2	.739	19	ATMSA5-3	.725	19	ATM/SA3-2	.553
20	SP1-2	.740	20	ATMSA1-3	.725	20	ATM/SA5-2	•557
21	SP5-2	.740	21	ATMSA7-3	.725	21	ATM/SA7-2	.557
22	SP3-2	.740	22	ATMSA7~3	.727	22	ATM/SA1-2	.558
23	ATM-1	.839	23	OWSNS3	.733	23	DA (DEPL) 1	.595
24	SP5-3	.884	24	OWSFS3	.734	24	ATM/SA5-3	.660
25	SP7-3	.886	25	OWSFS	.760	25	ATM/SA5-3	.661
26	SP1-3	.887	26	OWSNS	.760	26	ATM/SA7-3	.661
27	SP7-3	.889	27	ATM/DA-1	.880	27	ATM/SA1-3	.662
28	OWSFS5	.957	28	ATMSA5-4	.954	28	ATM/SA5-4	.888
29	OWSNS5	.977	29	ATMSA1-4	.956	29	ATM/SA3-4	.892
30	ATM-2	1.175	30	ATMSA3-4	.956	30	ATM/SA7-4	.892
31	CSM-1	1.271	31	ATMSA3-4	.962	31	ATM/SA1-4	.892
32	OWSFS6	1.298	32	OWSNS5	1.059	32	OWSFS5	.907
33	owsns6	1.298	33	OWSFS5	1.060	· 33	OWSNS5	.907
34	OWSFS7	1.301	34	OWSNS6	1.064	34	OWSFS6	.910
35	OWSNS7	1.301	35	OWSFS6	1.064	35	owsns6	.910
36	OWSNS8	1.320	36	OWSNS7	1.065	36	OWSNS7 -	.910
37	OWSFS8	1.323	37	OWSFS7	1.065	37	OWSFS7	.910
38	ATM-5	1.335	38	ATM/DA 2	1.129	38	SPAR/GRA1	1.034
39	CSM-2	1.404	39	CSMAX-1	1.222	39	CSMAX-2	1.109
40	ATM-4	1.568	40	CSMAX-1	1.243	40	CSMAX-1	1.142
41	SP1-4	1.829	41	OWSFS8	1.285	41	SPAR/GRA2	1.142
42	SP5-4	1.837	42	ATM/DA-3	1.309	42	DA(DEPL)2	1.275

	Initial		,	Pretest			Final	
	Major	Coupled		Major	Coupled		Major	Coupled
Mode	Contributor	Frequency	Mode	Contributor	Frequency	Mode	Contributor	Frequency
		4 4 - 4						
43	SP1-4	1.838	43	CSMAX-2	1.403	43	FAS/IU/OWS7	1.283
44	SP5-4	1.845	44	ATMSA5-5	1.415	44	ATM/SA7-5	1.331
45	ATM-3	2.266	45	ATMSA7-5	1.423	45	ATM/SA7-5	1.335
46	SP5-5	2.367	46	ATMSA3-5	1.424	46	ATM/SA1-5	1.339
47	SP1-5	2.368	47	ATMSA1-5	1.428	47	ATM/SA5-5	1.355
48	SP3-5	2.369	48	ATM/DA-4	1.569	48	FAS/IU/OWS8	1.389
49	SP7-5	2.373	49	ATMSA5-6	2.276	49	DA (DEPL) 3	1.956
50 51	OWSNS9	2.539	50	OWSFS9	2.283	50	ATM/SA5-6	2.062
52	OWSFS9	2.540	51	ATMSA5-6	2.302	51	ATM/SA5-6	2.077
	SP5-6 SP3-6	2.545	52	ATMSA1-6	2.302	52	ATM/SA7-6	2.078
53 54	SP7-6	2.546	53	OWSNS9	2.305	53	ATM/SA1-6	2.082
55		2.546	54	ATMSA1-6	2.315	54	OWSFS9	2.205
56	SP3-6 OWSNS10	2.546	55	ATM/DA 5	2.425	55	OWSNS9	2.236
57	OWSFS10	2.567 2.568	56	ATM/DA 10	2.513	56	RACK(OL)4	2.314
58	OWSNS11	2.500	57. 58	ATMSA5-7	2.616	57	ATM/SA5~7	2.505
59	OWSFS11	2.621	59	ATMSA7-7	2.621	58	ATM/SA7-7	2.511
60	·CSM-3	3.078	60	ATMSA3-7 ATMSA7-7	2.627	59	ATM/SA3-7	2.521
61	OWSNS12	3.214	61	CSMAX-3	2.634	60	ATM/SA7-7	2.526
62	OWSFS12	3.231	62	CSMAX-3	2.973	61	OWSNS10	2.560
63	OWSNS12	3.238	63	ATMSA7-8	2.982 3.055	62	OWSFS10	2.565
64	SP5-7	3.349	64	ATM/DA 9	3.520	63	OWSFS11	2.597
65	SP1-7	3.357	65	OWSFS10	3.520	64	OWSNS11	2.597
66	SP3-7	3.366	66	OWSNS10	3.590	65 66	OWSNS13	2.644
67	SP3-7	3.371	67	ATMSA5-9	3.662	67	OWSFS13 ATM/SA3-8	2.657
68	ATM-10	3.523	68	ATMSA3-9	3.679	68	ATM/SA3-8	2.793
69	ATM-8	3.694	69	ATMSA1-9	3.690	69	DA (DEPL) 5	2.824
70	SP3-8	3.959	70	ATMSA3-9	3.698	70	OWSFS12	2.946 2.992
71	SP5-8	3.968	71	ATM/DA 11	3:921	71	OWSNS12	2.992
72	SP3-8	3.970	72	OWSNS11	4.054	72	OWSNS12	3.208
73	SP1-8	3.974	73	OWSFS11	4.058	73	OWSFS14	3.208
74	OWSFS13	3.996	74	OWSFS12	4.247	73 74	OWSNS15	3.210
75 -	OWSNS13	3.996	75	OWSNS12	4.251	75	OWSFS15	3.210
76	ATM-11	4.264	76	OWSFS13	4.347	76	OWSFS16	3.213
77	OWSFS14	4.422	77	OWSNS13	4.348	77	OWSNS16	3.213
78	OWSNS14	4.423	78	ATMSA7-10	4.638	78	ATM/SA5-9	3.333
79	OWSNS15	4.436	79	ATMSA5-10	4.638	79	ATM/SA3-9	3.352
80	OWSFS15	4.436	80	ATMSA1-10	4.639	80	ATM/SA1-9	3.356
81	OWSFS16	4.483	81	ATMSA3-10	4.639	81	ATM/SA1-9	3.360
82	OWSNS16	4.483	82	OWSFS14	4.650	82	CSMAX-3	3.432
83	SP5-9	-5.064	83	OWSNS14	4.650	83	OWSFS17	3.621
⁻ 84	OWSFS17	5.363	84	OWSFS15	4.654	84	OWSNS17	3.682
85	OWSNS17	5.382	85	OWSNS15	4.654	85	DA (DEPL) 4	3.902
86	SP3-10	5.456	86	OWSNS16	4.663	86	ATM/SA3-10	4.033
87	SP5-10	5.481	87	OWSFS16	4.664	. 87	ATM/SA5-10	4.033
88	SP1-10	5.485	88	OWSFS17	4.783	88	ATM/SAl-10	4.034
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Initial			Pretest		Final			
						011		
Mode	Major Contributor	Coupled Frequency	Mode	Contributor	Coupled	Mode	Major Contributor	Coupled Frequency
Flotie	CONCLIDATOL	rrequency	node	CONCLIDATOL	Frequency	riode	CONCILIBREOL	riequency
89	SP1-10	5.486	8.9	OWSNS17	4.834	89	ATM/SA7-10	4.034
90	ATM-11	5.568	90	ATMSA7 11	4.883	90	MDA/STS/AM-1	4.575
91	CSM-4	5.612	91	ATMSA5 11	4.900	91	MDA/STS/AM-2	4.641
92	SP5-11	5.677	92	ATMSA3 11	4.908	92	ATM/SA3-11	4.685
93	SP3-11	5.778	93	ATMSA1 11	4.911	93	ATM/SA3-11	4.696
94	SP1-11	5.787	94	ATM/DA 13	5.114	94	ATM/SA1-11	4.700
95	SP5-11	5.815	95	CSMAX4	5.609	95	ATM/SA5-11	4.777
96	SP7-11	5.959	96	ATM/DA 6	5.707	96	SPAR/GRA5	4.916
97	owsns18	6.061	97	MDA/STS/AM-1	6.380	97	SPAR/GRA3 `	5.155
98	OWSFS18	6.061	98	ATMSA7-12	6.631	98	DA(DEPL)7	5.525
99	OWSFS19	6.175	99	ATMSA7-12	6.631	99	DA(DEPL)7	5.602
100	OWSNS19	6.176	100	ATMSA3-12	6.631	100	CSMAX-4	5.642
101	OWSFS20	6.209	101	ATMSA1-12	6.631	101	DA (DEPL) 6	6.045
102	owsns20	6.210	102	MDA/STS/AM-2	7.244	102	OWSNS18	6.092
103	Main 7	6.350	103	ATM/DA-7	8.374	103	ATM/SA7-12	6.097
104	CSM5	6.455	104	OWSFS18	8.631	104	ATM/SA1-12	6.097
105	SP7-12	6.862	105	OWSNS18	9.060	105	ATM/SA7-12	6.097
106	SP7-12	6.862	106	ATM/DA-6	10.813	106	ATM/SA1-12	6.097
107	SP3-12	6.862	107	ATM/DA-12	12.038	107	OWSFS18	6.123
108	SP1-12	6.862	108	MDA/STS/AM-3	12.894	108	SPAR/GRA6	6.280
109	Main 8	7.012				109	CANISTER1	6.407
110	ATM-7 SP3-9	8.364 11.847				110 111	DA(DEPL)8 OWSFS19	6.446
111 112	ATM-13	12.667]			1112	OWSNS19	6.463 6.465
112	AIM-13	12.007]		•	113	CSMAX-5	6.551
	,]			114	SPAR/GRA-7	6.967
		_			-	115	OWSFS24	7.379
			Ì			116	OWSNS24	7.690
						117	CANISTER2	7.894
						118	ATM/SA3-8	8.258
	_			_		119	ATM/SA3-17	8.672
	Frequenc Cutoff 15		}	Frequency		120	ATM/SA7-17	8.675
	Cutoff 15	HZ		Cutoff 15 Hz	Z /	121	ATM/SA5-17	8.675
						122	ATM/SA3-17	8.717
	•		İ			123	MDA/STS/AM-4	8.792
			1			124	FAS/IU/OWS16	8.831
		·			•	125	FAS/IU/OWS18	9.082
			1			126	ATM/SA5-20	9.148
						127	ATM/SA1-20	9.148
			1			128	ATM/SA3-20	9.149
						129	ATM/SA7-20	9.152
						130	FAS/IU/OWS17	9.177
				•		131	OWSNS25	9.293
		•				132	ATM/SA5-21	9.363
,						133	ATM/SA7-21	9.365
								•
L			L	,		l		

	Final	
	Major	Coupled
Mode	Contributor	Frequency
134	ATM/SA1-21	9.367
135	ATM/SA3-21	9.368
136	CANISTER-3	9.497
137	OWSFS25	9.551
138	FAS/IU/OWS22	9.563
139	CANISTER4	9.661
140	FAS/IU/OWS21	9.668
141	FAS/IU/OWS23	9.827
142	ATM/SA5-22	9.871
143	ATM/SA1-22	9.874
144	ATM/SA7-22	9.874
145	ATM/SA3-22	9.882
146	DA(DEPL)9	10.406
147	CANISTER5	10.608
148	CSMAX-9	10.628
149	ATM/SA3-25	11.057
150	ATM/SA3-25	11.057
151	ATM/SA5-25	11.057
152	ATM/SA7-25	11.057
153	MDA/STS/AM-3	11.288
154	SPAR/GRA-8	11.352
155	MDA/STS/AM-3	11.441
156	MDA/STS/AM-5 FAS/IU/OWS25	11.723
157 158	ATM/SA1-27	12.085 12.897
156	ATM/SA1-27 ATM/SA5-27	13.013
160	ATM/SA3-27 ATM/SA3-27	13.402
161	OWSNS27	13.130
162	MDA/STS/AM-8	13.185
163	ATM/SA1-27	13.412
164	MDA/STS/AM-7	13.479
165	OWSFS26	13.539
166	OWSNS26	13.602
167	OWSFS28	13.801
168	OWSNS28	13.820
169	CANISTER-6	14.084
170	CSMAX-10	14.280
171	CANISTER-7	14.543
172	MDA/STS/AM-8	14.602
	Frequency	-

Frequency Cutoff 15 Hz